

2023 IQBT Undergraduate Championship

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Round 17 – Tossups

1. A hero looking at this object is compared to a maiden rejoicing as she looks at her dress catching the moonlight. This object is used in a hasty marriage that takes place in the Cave of Macris on the advice of Queen Arete (“uh-RAY-tay”). With Aerope’s (“AY-roh-pee’s”) help, Thyestes (“thigh-ESS-teez”) steals an item similar to this object, which is obtained using an herb that grows from Prometheus’s blood. This object is created after a son of Nephele (“NEFF-uh-lee”) thanks the (*) gods for saving him from his stepmother Ino. A hero is commanded to obtain this object after arriving in the middle of an athletic contest wearing only one sandal. This object is given by Phrixus as a gift to King Aeëtes (“ay-YEE-teez”), who hangs it on an oak tree guarded by a serpent. For 10 points, name this treasure retrieved from Colchis (“KAWL-kiss”) by Jason and the Argonauts.

ANSWER: the Golden Fleece

2. In this state, Bloody Bill Cunningham carried out the “Bloody Scout” march in which he massacred Patriots. Tadeusz Kościuszko (“tuh-DAY-ush kosh-CHOOSH-koh”) was bayoneted in the butt during the siege of this state’s Ninety Six Star Fort, the revolution’s longest siege. The only successful use of a double envelopment in the American Revolution took place at a battle in this state fought near the Broad River, a major loss for the “Green Dragoon.” (*) Horatio Gates’s career basically ended after suffering a 1780 rout in this state at the hands of Lord Cornwallis. By deploying his army in three main lines in an open grazing area in this state, Daniel Morgan outmaneuvered and destroyed Banastre Tarleton’s army. The Battles of Cowpens and Camden took place in—for 10 points—what state, where the British successfully besieged Charleston?

ANSWER: South Carolina [prompt on Carolina]

3. Paul Cézanne (“say-ZAN”) effusively praised the “depth of ages” evident in one of Gustave Courbet’s (“koo-BAY’s”) many late paintings of these subjects. Edmond Goncourt (“gon-KOOR”) praised the “animals’ claws” in a painting of one of these entities that he popularized in France. A sculpture titled for one of these subjects, which employs onyx marble and incorporates female figures from *The Gossips*, was created by Camille Claudel. A famous painting of one of these entities best exemplifies the (*) “blue revolution” enabled by its artist’s use of Prussian blue. The cover of Claude Debussy’s original score for *La Mer* (“mair”) was a print of one of these entities featuring several thin, fragile boats. For 10 points, one of Katsushika Hokusai’s *Thirty-Six Views of Mount Fuji* depicts what type of phenomenon “off Kanagawa”?

ANSWER: waves [or the *Great Wave off Kanagawa*; accept tsunami; prompt on seas or oceans]

4. Six families of entities dependent on this quantity have been released by Donald Truhlar's group and are named for the University of Minnesota. Methfessel and Paxton solved convergence problems due to oscillations in this quantity by "smearing" this quantity. In the simplest case, this quantity is set equal to the sum, over i to capital- N , of the squared modulus of ϕ -of- i , in the (*) Kohn-Sham equations. A namesake "local approximation" for this quantity depends only on the value of this quantity at each point in space, and has exchange and correlation terms. This quantity is zero at the radial and angular nodes in atomic orbitals. For 10 points, name this quantity, used to measure the distribution of electrons in a namesake "functional theory."

ANSWER: density [or electron density; accept charge density or probability density; accept density of states before "squared modulus"; prompt on charge or probability before "functional theory"]

5. This novel's protagonist thinks of his girlfriend as like the "third beer," the one you drink not because you're thirsty but because it's there. That girlfriend in this novel treks home through a thunderstorm, manically dolls herself up in soaking-wet clothes and makeup, and comes down with the fever that kills her. While on a bobcat hunt in his family's ancestral home in Virginia, the protagonist of this novel is nearly garroted to death with a wire by a member of a group that says "your (*) day has come" to their victims. In this novel, that member of the Seven Days, Guitar Bains, helps the protagonist search for the gold supposedly owned by the protagonist's magical aunt Pilate. For 10 points, Milkman Dead is the protagonist of what Toni Morrison novel with a biblical title?

ANSWER: Song of Solomon

6. It's not quantification, but the C·R·T·P pattern is an instance of the F-bound form of this property. The Hindley-Milner system uses a "let" form of this property, which is narrower than the version used in System F. Haskell and ML support its "parametric" type, which in other languages is implemented via generics. In C++, vtables ("V-tables") and templates are used in dynamic and static dispatch to resolve this property at run- and compile-time, respectively. The plus sign indicating both (*) addition and concatenation is an example of operator overloading, an example of its ad hoc type. In Java, inheritance via interfaces implements a form of this property which allows subclasses to be treated the same as their parent class. For 10 points, name this term describing functions that can act on multiple types.

ANSWER: polymorphism [or polymorphic; accept function overloading or operator overloading before "overloading"]

7. George Reisner discovered a site in this region with a large temple called a *deffufa*. Red-topped black bowls mark the pan graves of a people from this region who served as a neighboring civilization's police force, the Medjay. Royal burials in this region occurred at El-Kurru until a ruler named Taharqa decided to be buried at Nuri. This region's C-Group culture was conquered around 1650 BC by its southern (*) Kerma culture. A three-headed, four-armed version of a lion god named Apedemak appears in this region at Naqa. Arakamani was the first ruler of a state in this region ruled by *kandakes* ("kun-DAH-kees") to move his burial site away from Naqada. Under King Piye ("PEE-yay"), people from this region established Egypt's 25th Dynasty. Meroe ("MEH-roh-wee") was in, for 10 points, what region, where the Kingdom of Kush ruled along the Nile.

ANSWER: Nubia [or an-Nūba or Nobīn; accept Upper Nubia or Lower Nubia; accept Kush or Oes; accept Triakontaschoinos or Dodekaschoinos; prompt on Sudan or Bilād as-sūdān or Sahel or Kordofan]

8. **Part of the opening passage of a novel by this author is reworked in the first sentence of Ali Smith’s *Autumn*. The opening passage of a novel by this author describes streets so muddy that one wouldn’t be surprised to see a forty-foot Megalosaurus waddling up them. The opening passage of another novel by this author states “we were all going direct to Heaven, we were all going direct the other way.” A semi-autobiographical novel by this author opens with the chapter (*) “I Am Born,” which begins with the line “Whether I shall turn out to be the hero of my own life [...] these pages must show,” spoken by a character who later encounters the scheming Uriah Heep. For 10 points, name this author who wrote “It was the best of times, it was the worst of times” at the start of his novel *A Tale of Two Cities*.**

ANSWER: Charles Dickens [or Charles John Huffam Dickens] (the other novels discussed are *Bleak House* and *David Copperfield*)

9. **Although women are traditionally banned from one form of this practice, the goddess Yemaya (“yuh-MYE-uh”) spied on her husband to learn it. One form of this practice uses a chain with eight pear-shaped seed pods called an Opele (“oh-pel-ay”). One form of this practice uses yarrow sticks sorted into two piles. Another version of this practice uses a tray with carvings of birds, rats, or humans around the rim, upon which a thin layer of powder is placed. That form of this practice produces one of (*) 256 configurations, the 16 principal and 240 minor *odu* (“oh-doo”). Initiated priests of Orunmila (“oh-roo-mee-lah”) called babalawos (“bah-bah-lah-woes”) perform a form of this practice called Ifá (“ee-fah”), which involves casting palm nuts. Another form of this practice repeatedly flips three coins to build a hexagram. For 10 points, name this practice that can be done using the *I Ching* (“ee ching”).**

ANSWER: divination [accept equivalents like fortune-telling or seeing the future; accept Ifá before mention]

10. **A former cultural affairs minister apologized for allowing this organization to change its name in 2015. This organization announced “Think Tank 2022” to promote “seeds of peace” at its 2021 Rally of Hope, whose headline speaker was Mike Pence. In January 2023, a welfare ministry warned this organization to stop promoting unsanctioned adoptions. In September 2022, it acknowledged a major case of “excessive (*) donations,” which it commonly solicits as repayment for an occupation that lasted from 1910 to 1945. Tetsuya Yamagami said this organization destroyed his mother’s finances, motivating him to assassinate Shinzo Abe. A text called the Divine Principle explains the purpose of its “blessings,” or mass weddings. For 10 points, name this religious cult founded by Sun-Myung Moon.**

ANSWER: Unification Church [or The Family Federation for World Peace and Unification or FFWPU; accept Moonies before “Sun-Myung Moon”]

11. **Lisa Delpit’s book about “cultural conflict” in this field argues that many problems in this field actually stem from miscommunication. A book about this field imagines a dialogue between the writer and a version of herself that uses her given name; that book argues for an “engaged” version of this field and calls this field “the practice of freedom.” People in this field should promote “conscientization” and “problem-posing,” rather than following the (*) “banking model,” according to a book about practicing this field in oppressed communities by Paulo Freire (“FRAY-ree”). A reformer in this field put many of her ideas into practice at the Casa dei Bambini. For 10 points, name this field.**

ANSWER: education [accept critical pedagogy; accept teaching; accept Pedagogy of the Oppressed; accept Teaching to Transgress] (The idea of “engaged pedagogy” was promoted in bell hooks’s *Teaching to Transgress*.)

12. A ruler of this kingdom allowed merchants to settle disputes without royal intervention, thereby creating the Consulate of the Sea, which also names a book of maritime trade laws from this kingdom. Under a king nicknamed “the Ceremonious,” this dynasty ended the Judicate of Arborea. Walter of Brienne’s (“bree-YEN’s”) forces were defeated by Roger de Flor’s mercenaries from this kingdom, which then annexed the Duchy of Athens. Pope (*) Martin IV (“the fourth”) ordered a crusade against this kingdom after its ruler Peter III (“the third”) accepted a request to invade Sicily in response to the Sicilian Vespers. Peter IV (“the fourth”) deposed James III (“the third”) of Majorca (“muh-YOR-kuh”), bringing it under control of this kingdom long ruled by the House of Barcelona. For 10 points, name this eastern Spanish kingdom that eventually united with Castille (“kass-STEEL”).

ANSWER: Kingdom of Aragon [or Aragón; or Aragó; or Aragonum]

13. Many motives in this opera derive from a *grund-thema* whose original appearance starts with the following rhythm in 4/4 time: quarter rest, quarter tied to eighth, eighth, eighth tied to dotted eighth. For more than 30 years after the death of this opera’s composer, his widow tried to forbid it from being staged anywhere except the theater in which it premiered. A character decries his unworthiness to lead a communion rite in the aria “Nein! Lasst ihn unenthüllt” (“nyne! last een un-ent-HULL’t”) in this opera, whose most popular instrumental excerpt is the (*) “Good Friday Music.” This opera ends with the death of the cursed seductress Kundry after the title character uses the Holy Spear to heal Amfortas’s wound. For 10 points, name this final opera by Richard Wagner, whose title character becomes leader of the knights of the Holy Grail.

ANSWER: Parsifal

14. This system can be solved by combining two coupled equations in terms of x and y to a single complex parameter “ x plus i - y ”, and ignoring the z component. The phase change in this system can be decomposed into the dynamic angle and the Hannay angle, which illustrates the Berry phase. One method of solving this system applies parallel transport to a vector tangent to the surface, then uses the Gauss–Bonnet (“baw-NAY”) theorem to equate the enclosed solid angle to the net (*) precession. This apparatus returns to its original orientation with a period of 24 divided by the sine of the latitude. These systems are often set inside a ring with cones standing along the edge. The first of these systems was set up at the dome of the Panthéon in Paris. For 10 points, name this apparatus whose French namesake used it to show that the earth rotates.

ANSWER: Foucault pendulum [or Foucault’s pendulum; prompt on partial answer]

15. Richard Prins translated a poem in this form titled for the refrain “what would you do for a treat?” This poetic form was used to write the epic *Bao Naligwa* by Muyaka bin Haji al-Ghassaniy (“all-gah-SAH-nee”). Two similar names for this poetic form, *mashairi* (“mah-shah-EE-ree”) and *shairi* (“shah-EE-ree”), refer to the most widespread form of Swahili poetry in the 19th century and to the form used by Rustaveli to write the Georgian epic *The Knight in the Panther’s Skin*. A poem in this form asks the speaker’s “beloved” to “fill the (*) Cup that clears / Today of past Regrets and future Fears.” A book of poems titled for this form describes “A Jug of Wine, A Loaf of Bread—and Thou” in the English translation by Edward FitzGerald. The *Rubaiyat* (“ROO-buy-ah”) of Omar Khayyam (“kye-AHM”) contains poems in, for 10 points, what form that sometimes consists of two couplets?

ANSWER: quatrains [accept mashairi, shairi, or rubāʿī before mentioned]

16. A new definition of this property based on *Tractatus Logico-Philosophicus* was presented by D. M. Armstrong in a book titled *A Combinatorial Theory of this property*. David Chalmers has argued that conceivability should be understood in terms of the epistemic form of this property, but not its metaphysical form. The position that possessing this property does not entail existence is called “ersatzism.” In modal logic, this property is denoted by a (*) diamond-shaped operator. The adjectival form of this property appears in the name of a semantics that evaluates propositions across alternative realities. A term must pick out the same thing in all states of affairs possessing this property in order to be a rigid designator. For 10 points, what property describes “worlds” that could exist?

ANSWER: possibility [or possible; accept possible worlds; accept possible existence or possibly existing; prompt on modal or modality; reject “existence”]

17. The wall of this structure is the most common biopsy site for diagnosing Whipple’s disease. This structure is compressed by two blood vessels in S·M·A syndrome. A double-bubble sign on an ultrasound indicates atresia (“uh-TREE-zhuh”) of this structure, which often occurs in patients with Down syndrome. The third and fourth segments of this structure attach to the ligament of Treitz. Brunner’s glands are most commonly found in the wall of this structure, which secretes an alkaline fluid to (*) neutralize chyme (“kyme”). The common bile duct empties into this structure, through which it accepts lipase (“LYE-pace”) and amylase (“AM-uh-lace”) from the pancreas. This structure is immediately distal to the pyloric sphincter. For 10 points, name this first segment of the small intestine, before the jejunum (“jeh-JOO-num”) and ileum (“ILL-lee-um”).

ANSWER: duodenum (“duo-DEE-num” or “dew-AH-duh-num”) [prompt on gastro-intestinal tract, GI tract, intestine, or small intestine]

18. In the 2010s, a pianist from this country, Christina Petrowska-Quilico, produced editions of 15 piano pieces by a recently deceased feminist composer from here, titled *Glass Houses*. A conductor from this country won a 2022 Grammy for recording the first and third symphonies of Florence Price. A composer from this country coined the term “soundscape” and promoted acoustic ecology in his book *The Tuning of the World*. A conductor from this country is currently music director of the (*) Philadelphia Orchestra and the Metropolitan Opera. R. Murray Schafer was from this home country of a pianist who abandoned live public performance in 1964 and made two landmark recordings of the *Goldberg Variations* in 1955 and 1981. For 10 points, name this country of origin of Yannick Nézet-Séguin (“nay-ZEH say-GAN”) and Glenn Gould.

ANSWER: Canada (The first composer is Ann Southam)

19. In a play by this author, the protagonist is tricked into signing a document by a man who spreads the rumor that the protagonist takes a rubber stamp home and lets his children play with it. The protagonist disguises himself with a papier-mâché nose and proposes swapping Small Dance Floor C and Large Dance Floor A in a play by this author that begins with the protagonist playing chess with himself. In another play by this author, Josef (*) Gross fights the official adoption of the bureaucratic language Ptydepe (“puh-TID-uh-pay”). He wrote a play in which the Liquidation Office hires Hugo Pludek after he uses clichés and jargon to bamboozle people at the title outdoor gathering. For 10 points, name this author of *The Memorandum* and *The Garden Party*, who was a prominent Czech politician.

ANSWER: Václav (“VATS-laff”) Havel

20. **Mary Dudziak analyzed this country’s constitution’s strong property rights, which were successfully argued for during negotiations by Thurgood Marshall. The 1902 Crown Lands Act reserved fertile land for White settlers in this country, whose White community included influential settler Lord Delamere. Delamere was part of this country’s hedonistic White community, the Happy Valley Set. The (*) White Highlands were reserved for Whites in this country, where Evelyn Baring used a system of concentration camps to suppress a revolt led by Dedan Kimathi. The Kapenguria Six were arrested in this country during a revolt primarily composed of Kikuyu people. For 10 points, the Mau Mau (“mao mao”) uprising occurred in what country shortly before it achieved independence under Jomo Kenyatta?**

ANSWER: Republic of Kenya [or Jamhuri ya Kenya]

Round 17 – Bonuses

1. To create a safe space for performing contemporary music, this composer founded the Society for Private Musical Performances, which posted a sign saying, “Critics are forbidden entry.” For 10 points each:

[10e] Name this leader of the Second Viennese School and creator of the twelve-tone technique.

ANSWER: Arnold **Schoenberg**

[10m] The Society for Private Musical Performances performed arrangements for string quartet, piano, and harmonium of pieces by this composer, including *Roses from the South* and *Wine, Women, and Song*.

ANSWER: Johann **Strauss II** (“the second”) [or Johann **Strauss Jr.**; or Johann Baptist **Strauss the Younger**; or Johann **Strauss the Younger**; or Johann **Strauss the Son**; prompt on **Strauss**; prompt on **J. Strauss**; prompt on **Johann Strauss**]

[10h] The Society for Private Musical Performances never performed its chamber orchestra arrangement of this symphony, whose outer movements both begin with E–G-sharp violin tremolos, and whose slow movement was the first symphonic use of Wagner tubas.

ANSWER: Anton **Bruckner’s Symphony No. 7** in E major, WAB 107

2. This process’s namesake index is calculated by finding the number of cells undergoing this process per high-powered field. For 10 points each:

[10e] Identify this portion of the cell cycle that starts with prophase and ends with telophase. This form of cell division produces two daughter cells identical to the parent cell.

ANSWER: **mitosis** [or **M**-phase]

[10m] The G2/M transition in the cell cycle is triggered by MPF, which is a complex between one of these proteins and its namesake dependent kinase. These proteins rise and fall at each phase of the cell cycle.

ANSWER: **cyclins**

[10h] This process occurs when a cell undergoes S phase without M phase. In humans, mega-karyo-cytes undergo this process to become up to 32- or 64-ploid, and it also occurs in *Drosophila* follicle cells.

ANSWER: **endo-reduplication** [or **endo-replication** or **endocycling**]

3. This author’s life partner, dancer Vincent Warren, is the addressee of his poem “Having a Coke with You.” For 10 points each:

[10m] Name this American poet who reacted to the death of Billie Holiday in the poem “The Day Lady Died” in his collection *Lunch Poems*.

ANSWER: Frank **O’Hara** [or Francis Russell **O’Hara**]

[10h] O’Hara’s *Lunch Poems* were published as part of this publisher’s Pocket Poets Series. Other collections released by this publisher include Robert Bly’s *The Teeth-Mother Naked At Last* and another poet’s collections *Planet News* and *Reality Sandwiches*.

ANSWER: **City Lights** Publishers

[10e] City Lights was sued for obscenity for publishing this Beat poet’s collection *Howl and Other Poems*.

ANSWER: Allen **Ginsberg** [or Irwin Allen **Ginsberg**]

4. Dr. William Rowley drew a woman with horns in one of his many pamphlets arguing against the adoption of this practice. For 10 points each:

[10e] Name this practice, which was made compulsory in Britain years after Edward Jenner used a boil on Sarah Nehmes' hand to infect his gardener's son with cowpox.

ANSWER: **vaccination** against smallpox [or **inoculation** against smallpox]

[10h] Jenner was opposed by Rowley and Dr. Benjamin Moseley, both of whom practiced this earlier inoculation technique, in which a person is exposed to smallpox with hopes of triggering a mild case.

ANSWER: **variolation**

[10m] Moseley's fear that inoculation gave people bovine features was mocked in one of these works by James Gillray. John Tenniel produced these works for 50 years at a publication founded by Henry Mayhew.

ANSWER: **Punch** political **cartoons** [accept *The London Charivari* in place of **Punch**; prompt on **cartoons** by asking "in what magazine?"]

5. This is the earlier of the two holidays on which the *machzor* ("mock-ZOR") is used. For 10 points each:

[10e] Name this holiday during which bread or pebbles are cast into a river during *tashlich* ("tash-LEEK"). It is the first of the High Holy Days of Judaism and marks the new year.

ANSWER: **Rosh Hashanah** [or **Yom Teruah**]

[10m] Two answers required. These two foods are the most common Ashkenazi foods at Rosh Hashanah celebrations. They represent the hope for a sweet new year.

ANSWER: **apples** and **honey** [accept in either order]

[10h] This prayer is recited daily during the Ten Days of Repentance between Rosh Hashanah and Yom Kippur. This prayer's name means "Our Father, Our King."

ANSWER: **Avinu Malkeinu**

6. Answer the following about ethical hedonism, or the belief that pleasure is morally good. For 10 points each:

[10e] Followers of this Greek atomist try to achieve sustainable pleasure through attaining the states of *ataraxia* and *aponia*. In modern times, his name is inaccurately associated with sensual pleasures like gluttony.

ANSWER: **Epicurus** [or **Epikouros**]

[10h] Epicurus's ideas were inspired by those of an earlier hedonist, Aristippus, who hailed from this city, from which his philosophical school takes its name

ANSWER: **Cyrene** ("sy-REE-nee") [or **Kyrēnē**; accept **Cyrenaics**; accept **Kyrēnaikoi**]

[10m] This 20th-century philosopher attempted to refute ethical hedonism with his "experience machine" thought experiment, in which people prefer reality to a pleasure-giving machine. His thought experiment of the "utility monster" can also be used to target hedonism.

ANSWER: Robert **Nozick**

7. A 2022 *Lancet* study found that this disease’s most common treatment is only about 60% effective in the “real world” despite 99% effectiveness in trials, due to noncompliance with the drug regimen. For 10 points each:
[10e] Name this deadly sexually-transmitted disease which has been massively curtailed in the US due to widespread availability of pre-exposure prophylaxis, or PrEP.

ANSWER: HIV/AIDS [accept HIV; accept Human Immunodeficiency Virus or Acquired Immunodeficiency Syndrome]

[10m] This US government program, established in 2003, is estimated to have saved 25 million lives with its anti-HIV efforts. Anthony Fauci was awarded the Medal of Freedom for his work in developing this program.

ANSWER: PEPFAR [or President's Emergency Plan for AIDS Relief]

[10h] PEPFAR is exempt from this policy that prohibits NGOs that receive US aid from providing abortion services. This policy was instituted by Reagan and has been rescinded by every Democratic president and reinstated by every Republican president since.

ANSWER: global gag rule [or the Mexico City policy; reject “global gag order” or “gag rule”]

8. The building at number 300 on this street housed the N·Y·P·D from 1862 to 1909, during which time Thomas Byrnes popularized the use of a rogue’s gallery. For 10 points each:

[10h] Name this street, which names a “Bend” at the heart of the Five Points neighborhood. Jacob Riis (“reese”), who wrote a book titled *Out of this street*, took a picture of an alley off of it, Bandit’s Roost.

ANSWER: Mulberry Street [accept *Out of Mulberry Street*; accept Mulberry Bend]

[10e] Bishop Henry Potter opened an unsuccessful Mulberry Street tavern that discouraged drinking, which was named for its proximity to a station of this newly created transportation system operated by the MTA.

ANSWER: New York City subway system [accept New York City metro, train, or underground; prompt on New York City rapid transport]

[10m] Mulberry Street was a center for immigrants from this country. The 1920 Wall Street bombing is believed to have been committed by supporters of a man from this country.

ANSWER: Republic of Italy [or Italia; or Italian Republic; or Repubblica Italiana; accept Italian-Americans]

9. This book’s author remembers a poem by Otero Silva while debating whether to stay in Miramar with his girlfriend Chichina. For 10 points each:

[10m] Name this memoir of the author’s youthful journeys across South America with Alberto Granado.

ANSWER: *The Motorcycle Diaries* [or *Diarios de motocicleta*] (by Che Guevara)

[10e] In his memoirs of the Cuban Revolution, Che Guevara ponders his wounds while recalling a story by this author whose protagonist “freeze[s] to death in the wastes of Alaska.” This American wrote *The Call of the Wild*.

ANSWER: Jack London

[10h] This editor and translator of Che’s Bolivian diaries admitted, contrary to his publisher’s claims, that he never actually knew Che. This author’s works of “magic journalism” include *The Soccer War* and an account of Haile Selassie’s downfall titled *The Emperor*.

ANSWER: Ryszard Kapuściński (“kah-poosh-CHEEN-skee”)

10. In a more expensive alternative to the Béchamp (“bay-SHAHN”) reduction, this metal can be combined with concentrated hydrochloric acid to reduce nitro-benzene to phenyl-amine. For 10 points each:

[10m] Name this metal, which undergoes a trans-metalation step with palladium in the Stille (“stilly”) coupling. Toxic tri-butyl organo-metallic compounds of this metal were historically used to prevent fouling on ship hulls.

ANSWER: **tin** [or **Sn** or **stannum**]

[10e] Tri-butyl-tin hydride can remove hydroxyl groups through a mechanism based on these reactive molecules with an unpaired valence electron. Azo-bis-iso-butyro-nitrile, or AIBN, serves as an “initiator” to produce these molecules.

ANSWER: free **radicals** [or **radical** initiator]

[10h] Tri-butyl-tin hydride is used in multiple radical reactions named for this British chemist, including a de-oxygenation and a de-carboxylation. He also names a reaction where photolysis (“fuh-TAH-luh-siss”) of a nitrite ester achieves remote functionalization.

ANSWER: Sir Derek (Harold Richard) **Barton** [accept **Barton**–McCombie deoxygenation, **Barton** decarboxylation, **Barton** reaction or **Barton** nitrite ester reaction]

11. During the first century CE, a group of the Iranian Saka people founded a Buddhist kingdom in this region called the Kingdom of Khotan. For 10 point each:

[10m] Name this region, whose northern end was home to an Indo-European population identified by the Tocharian language. Shànshàn, Karashr, and Kùchē (“koo-chuh”) were Silk Road trading states in this region.

ANSWER: **Xīnjiāng** [or **Tarim Basin** or **Altishahr** or **Dzungaria** or **Kashgaria**]

[10e] The Silk Road city states of the Xīnjiāng were first conquered by China under this dynasty, which shares its name with China’s largest ethnic group.

ANSWER: **Hàn**

[10h] Karashr and Kashgar were two of the Four Garrisons of Ānxī, which were overrun in the 760s by this empire. This empire’s founder married the Hàn Princess Wénchéng.

ANSWER: **Tibetan** Empire

12. A 101-story skyscraper by this architect consists of three connected buildings called “stems,” which are each composed of stacked “frustum” shapes. For 10 points each:

[10h] Name this architect whose Vista Tower surpassed her own earlier Aqua Tower as the world’s tallest building designed by a woman.

ANSWER: Jeanne **Gang**

[10e] Jeanne Gang’s architecture firm, Studio Gang, does much of its work in this city. Anish Kapoor’s sculpture *Cloud Gate* is a landmark in this city, where the Willis Tower is located.

ANSWER: **Chicago**, Illinois

[10m] Aqua Tower is located west of Lake Shore Drive, the site of four apartment buildings designed by this architect. This architect designed Crown Hall while heading the architecture school at the Illinois Institute of Technology.

ANSWER: Ludwig **Mies** van der Rohe (“MEESS van der ROH”)

13. In general relativity, this property means that there are many different Lanczos (“LAN-tsosh”) tensors that generate a single Weyl (“vile”) tensor. For 10 points each:

[10h] Name this property of certain field theories in which the scalar and vector potentials can be transformed without affecting the resulting fields.

ANSWER: **gauge** (“gay’j”) invariance [or **gauge** theory or **gauge** field or **gauge** symmetry or **gauge** freedom]

[10e] This non-abelian gauge theory unifies the electromagnetic, weak, and strong interactions and is central to particle physics. It includes quarks, leptons, gauge bosons, and the Higgs boson.

ANSWER: **Standard Model**

[10m] In a gauge transformation, this operation of the function f is subtracted from the scalar potential. The negative of this operation on the magnetic flux equals the $e \cdot m \cdot f$, according to Faraday’s law.

ANSWER: **time derivative** [accept partial **time derivative**; accept total **time derivative**; accept **derivative with respect to time**; prompt on **derivative** or **differentiation** with “with respect to what quantity?”]

14. A man who hypothesizes that this event was caused by a vein of sulfur ignores another man’s entreaties to provide him with wine and oil. For 10 points each:

[10h] Name this event that occurs directly after a sailor lets an Anabaptist drown and before the execution of a man who married his own godparent.

ANSWER: Great **Lisbon Earthquake** [or the 1755 **earthquake in Lisbon**; prompt on **earthquake** by asking “In which city?”]

[10e] That satirical portrayal of the Lisbon earthquake appears in this French author’s novel *Candide*.

ANSWER: **Voltaire** (“vohl-TAIR”) [or François-Marie **Arouet**]

[10m] An earthquake 108 years earlier provides the setting for this German author’s story, “The Earthquake in Chile.” The title noblewoman places an advertisement in a newspaper to try to find out who impregnated her in his novella *The Marquise of O*.

ANSWER: Heinrich von **Kleist** [or Bernd Heinrich Wilhelm von **Kleist**]

15. In the 1910s, Henry Goddard worked with Robert Yerkes (“YER-kees”) to administer intelligence tests called Alpha and Beta to over one million people in this organization. For 10 points each:

[10m] Name this organization. The results of those intelligence tests on members of this organization were used as evidence to pass the 1924 Immigration Restriction Act.

ANSWER: the US **army** [prompt on the **military** by asking “Which branch?”]

[10e] Soldiers often suffer from this disorder, which was referred to as “shell shock” during World War I.

ANSWER: **PTSD** [or **post-traumatic stress disorder**]

[10h] This 2014 book by Bessel van der Kolk describes the long-term impact of PTSD, and advocates for non-pharmaceutical interventions as treatment for some sufferers.

ANSWER: *The **Body Keeps the Score**: Brain, Mind, and Body in the Healing of Trauma*

16. If this statement is true, then the Tonelli–Shanks algorithm for finding the square root modulo p is guaranteed to run in polynomial time. For 10 points each:

[10h] Name this conjecture which states that the real part of the non-trivial zeros of any Dirichlet L -function is one-half.

ANSWER: **generalized Riemann** (“REE-mahn”) hypothesis [or **GRH**; prompt on **Riemann** or **Riemann hypothesis**, reject “grand Riemann hypothesis” or “extended Riemann hypothesis” or “ERH”]

[10e] The generalized Riemann hypothesis implies Goldbach’s weak conjecture, which states: every odd number greater than 5 equals the sum of three of these numbers. All integers can be uniquely factored into these numbers.

ANSWER: **prime** numbers

[10m] The generalized Riemann hypothesis would also considerably strengthen this asymptotic growth rate of the prime counting function π -of- x given by the prime number theorem. Give your answer in terms of x .

ANSWER: **x over log-of- x** [or **x divided by log-of- x** ; accept “natural log” or “ln” instead of “log”]

17. One of these groups, Delije (“DELL-ee-yeh”), formed the basis of Arkan’s Tigers, the paramilitary group led by the organized crime boss Arkan. For 10 points each:

[10h] Name these groups. Delije fought another of these groups, the Bad Blue Boys, during the Maksimir riots a week after the election of Franjo Tudjman (“TOODJ-man”).

ANSWER: **ultras** [prompt on **fans** of any sport]

[10m] Tudjman declared this country’s independence, which was secured after the success of Operation Storm. The Erdut Agreement integrated an ethnic state called Krajina (“KRA-yee-nah”) into this country.

ANSWER: Republic of **Croatia** [or Republika **Hrvatska**]

[10e] The Krajina was an ethnic state declared for these people, who made up Arkan’s Tigers. These people name a republic whose first President was Slobodan Milošević (“mee-LOH-sheh-vich”).

ANSWER: **Serbs** [or **Srbi**; accept Republic of **Serbia**; accept **Serbian** Krajina]

18. In early Renaissance paintings, this art form was often used to decorate the halo of the Virgin Mary, such as in Masaccio’s *Madonna and Child* altarpiece. For 10 points each:

[10e] Name this art form that Italian Renaissance artists imitated with “pseudo-Kufic” script. This Islamic art form was often used to create ornamented manuscripts of the Qur’an.

ANSWER: Arabic **calligraphy** [or **khatt**]

[10h] Pseudo-Arabic calligraphy adorns the halo of the Virgin Mary in this International Gothic artist’s *Adoration of the Magi*. Commissioned by Palla Strozzi, this artist’s version of the *Adoration* includes lavish amounts of real gold.

ANSWER: **Gentile** da Fabriano [accept Gentile da **Fabriano**]

[10m] Pseudo-Kufic script appears on a vase in this triptych usually attributed to Robert Campin, which depicts Mary receiving the Annunciation in the central panel and Joseph building a mousetrap on the right.

ANSWER: **Merode** *Altarpiece*

19. Discordians consider this god to be a patron of humor who was incarnated as one of the Marx brothers. For 10 points each:

[10h] Name this Egyptian god who became popular during the Hellenistic period. He was usually depicted as a child with a finger at his lips, so Romans interpreted him as a god of silence.

ANSWER: **Harpocrates** (“har-PAH-kruh-tees”) [or **Heru-pa-Khered**; prompt on **Harpo** Marx; prompt on **Horus**]

[10m] This man adapted Harpocrates into an aspect of Heru-ra-ha, a composite god from his religion of Thelema. His followers worshipped Horus using sex magick.

ANSWER: Aleister **Crowley**

[10e] Another Egyptian deity popular among occultists and alchemists is this one, who was syncretized with Hermes into the figure Hermes Trismegistus (“triz-MEG-iss-tuss”). This ibis-headed god of wisdom invented writing.

ANSWER: **Thoth** [or **Djehuty**]

20. This poet is parodied in the third line of each stanza of Wendy Cope's poem "God and The Jolly Bored Bog-Mouse." For 10 points each:

[10e] Name this Irish poet who wrote the collection *Death of a Naturalist* and a 1999 verse translation of *Beowulf*.

ANSWER: Seamus (Justin) **Heaney**

[10h] Cope's poem "Duffa Rex" opens with the words "King of the primeval avenues, the municipal parklands: architect of the Tulse Hill Poetry Group," parodying the opening of this thirty-poem cycle, which opens "King of the perennial holly-groves, the riven sandstone: overlord of the M5."

ANSWER: ***Mercian Hymns*** (by Geoffrey Hill)

[10m] "God and The Jolly Bored Bog-Mouse" and "Duffa Rex" appear in a collection titled *Making Cocoa for* this author, who wrote a novel in which Jim Dixon's lecture on "Merrie England" descends into a drunken tirade.

ANSWER: **Kingsley Amis** [prompt on Amis; accept *Making Cocoa for Kingsley Amis*] (That novel is *Lucky Jim*.)