

HARI (Hari's Academic Regionals(-minus) Invitational): Harimoment magnitude scale

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ROUND 12

Tossups

1. **A 2006 bill passed in this state mandates that its Air Resources Board update its Scoping Plan every five years. This state was the first to implement a multi-sector cap and trade program. An executive order has mandated that all passenger trucks and cars sold in this state must be zero-emission by 2035. In 2020, Tropical Storm Fausto caused the largest ever event in this state of one type known as (*) August Complex.** The PG&E company, headquartered in this state, has been accused of complicity in a series of disasters in this state, including one affecting the town of Paradise named for Camp Creek Road. For 10 points, name this state, where funding from wildfire prevention budget has been cut by governor Gavin Newsom.

ANSWER: **California**

<Current Events, Nageswaran>

2. **A character in this play uses the fact that the President's wife would pick up the phone if he called as evidence that he has "clout." After climbing a huge ladder, a character in this play runs into an "imaginary friend" that he had met earlier while watching a diorama. That character tells the audience "the great work begins" in this play's prologue. The ghost of (*) Ethel Rosenberg haunts a man who hoards medicine for "liver cancer" named Roy Cohn in this play. After being told that God will only return if humanity decides to "stop moving," Prior Walter decides that he will not be a prophet at the end of this play's second section, Perestroika.** For 10 points, name this play by Tony Kushner set in the midst of the AIDS epidemic.

ANSWER: ***Angels in America: A Gay Fantasia on National Themes***

<Drama, Schwartz>

3. **The velocity of a "micro" form of this phenomenon in stellar atmospheres, symbolized lowercase xi (ξ), can be calculated from absorption line broadening. The supersonic form of this phenomenon in the interstellar medium partially explains why star formation rates are only 1% of the value predicted by Jeans collapse. This physical phenomenon in the atmosphere produces astronomical seeing, which broadens the point spread function. Wavefront (*) distortions caused by layers where this phenomenon occurs can be corrected by adaptive optics. Ground-based observatories must account for the refraction caused by this phenomenon in the atmosphere, which causes eddies and large velocity fluctuations.** For 10 points, name this chaotic fluid motion that causes bumpiness on airplane rides.

ANSWER: **turbulence** [or micro**turbulence**; or supersonic **turbulence**; or atmospheric **turbulence**; prompt on astronomical seeing or atmospheric distortion or scintillation or twinkling or refraction with "what physical phenomenon is responsible for that?"]

<Other Science, Chen>

4. **A composer from this country orchestrated a tenor and a choir for his third symphony, nicknamed *The Song of the Night*. Another composer from this country developed limited aleatorism for his third symphony. A musician born in this country was the first person to record J. S. Bach's *Goldberg Variations* on the harpsichord. A composer from this country created tone clusters with (*) 52 string instruments in *Threnody for the Victims of Hiroshima*. Delfina Potocka was the dedicatee of a Piano Concerto No. 2 in F minor and the Minute Waltz by a composer from this country. For 10 points, name this home country of Wanda Landowska, Witold Lutoslawski, and Frédéric Chopin.**

ANSWER: Poland (The first composer is Karol Szymanowski.)

<Auditory Fine Arts, Zhang>

5. **The trial and torture of two girls named Djamila in this city led Gisèle Halimi to coauthor a book titled for one of them. Students who demonstrated during this city's 1988 "Black October" forced president Chadli Bendjedid to adopt a more liberal constitution. This city's chief of police Roger Gavoury was assassinated by a paramilitary group that had a stronghold in its (*) Bab El Oued neighborhood. Four generals, including Raoul Salan, led a putsch in this city and later founded a group whose name translates to Secret Army Organization. This city's Casbah was a major site of operations for the guerilla FLN. After France signed the Evian Accords, this city became the capital of a newly independent African country. For 10 points, name this capital of Algeria.**

ANSWER: Algiers [The book in the first line is *Djamila Boupacha*, which was co-authored with Simone de Beauvoir.]

<World History, Zhang>

6. **This state's most populous city, where Will Brown was lynched in 1919, had its Greek neighborhood destroyed in another riot. A law passed in this state banning the teaching of foreign languages was ruled unconstitutional after it was sued by Robert Meyer. At a convention in this state, Ignatius Donnelly authored the preamble of a party platform that called for government ownership of (*) railroads. This state's George W. Norris sponsored the creation of the Tennessee Valley Authority. In arguing for a 16 to 1 ratio of silver to gold, a politician from this state told a crowd that "you shall not crucify mankind upon a cross of gold". For 10 points, name this home state of William Jennings Bryan, the site of the Omaha race riots.**

ANSWER: Nebraska

<American History, Nageswaran>

7. **One poet from this country used 11 and 7-syllable lines in a poem which indirectly refers to spring as "the flowery season." A poet from this country compared a rival's huge nose to that of a swordfish, implying that he was secretly Jewish. The subject of that attack advanced his metaphor-heavy poetic movement "Culteranism" over his rival's more straightforward (*) "Conceptism" movement. The Generation of '27 was named for the death of an author from this country, and included a poet who described a tragedy "at five in the afternoon" in "Lament for the Death of a Bullfighter." For 10 points, name this country whose golden age produced poets like Francisco de Quevedo and Luis de Góngora, who later inspired authors like Federico García Lorca.**

ANSWER: Kingdom of Spain [or Reino de España] (The first poem is from *Soledades* by Góngora.)

<Non-Epic Poetry, Schwartz>

8. **High amounts of this quantity generate higher revenues in an auction by the linkage principle. The "leader" and "follower" firms in the Stackelberg model of oligopoly differ in their amounts of this resource. In extensive form representations, a dotted line connecting different nodes represents this quantity's namesake "set," elements of which are indistinguishable to players. George (*) Akerlof used quality uncertainty as an example of differences in this quantity that occurs when selling used cars known as "lemons." This quantity is called "perfect" in a game when players can observe all past moves. For 10 points, what quantity's "asymmetry" occurs when one player knows more than another?**

ANSWER: information [accept information set or information asymmetry]

<Social Science, Zhang>

9. **This element is the heavier of two elements whose +5 oxidation state is responsible for the color of heteropoly blues. Those compounds are formed by the reduction of compounds that adopt the Keggin or Dawson structures with this element as an addendum atom. The reversible reaction between lithium and this element's trioxide creates color changes in electrochromic glass due to the formation of this element's bronze. A carbide of this element, which is extracted from the ore (*) scheelite, is used in the tips of ballpoint pens. This element has both the highest tensile strength and melting point of any metal, so it is used in lightbulb filaments. For 10 points, name this element whose ore wolframite is the source of its atomic symbol W.**

ANSWER: **tungsten** [accept **wolfram** before "wolframite"; accept **W** before "W"]

<Chemistry, Tong>

10. **In a gigantic ceiling painting, this figure stands opposite Glory, who sits on a cloud, and above two putti playing cards. The goddess of Justice appears engraved in gold on a column in a portrait of this figure which depicts him standing on a floral, golden carpet. A woman in pink watches as a worker puts a portrait of this figure into a (*) crate in Jean-Antoine Watteau's painting *The Shop-Sign of Gersaint*. This ruler posed with a golden scepter in his right hand in Hyacinthe Rigaud's official portrait of him. This ruler named Charles Le Brun as "first painter" and commissioned him to paint the Hall of Mirrors in his royal residence. For 10 points, name this French king who commissioned the Palace of Versailles in the 1660s.**

ANSWER: **Louis XIV** [prompt on **Louis** alone; prompt on the **Sun King** or le **Roi Soleil**]

<Visual Fine Arts, Parameswaran>

11. **This non-Korean author created a character who stops eating after sympathizing with food and bakes a cake in the shape of a female body for her fiancé. This author asked in a 2018 op-ed "Am I a Bad Feminist" and rejected labeling as feminist a novella in which twelve maids are hanged despite helping the title character. This author of *The Edible Woman* and the (*) *Penelopiad* wrote a 2019 novel in which the "Founders" Elizabeth, Helena and Vidala train young fertile women at the Red Center. This author created Aunt Lydia, who describes her role during the rise and fall of the patriarchal Republic of Gilead. For 10 points, name this Canadian author of *The Testaments* and *The Handmaid's Tale*.**

ANSWER: Margaret **Atwood**

<Long Fiction, Zhang>

12. **The "great", or "Maha" form of this concept names a wrathful, dharmapala in Tibetan Buddhism that is a manifestation of Shiva. A tantric text partially named for this concept describes the mythical kingdom Shambhala, in which the avatar of Vishnu Kalki will be born. This concept is divided into four divisions, each symbolized by a precious metal, named for Krita, Treta, Dwapara and Kali. This concept, which can be divided into units called (*) kalpas and yugas, is represented by a rotating mandala wheel called the *kalachakra*, which emphasizes this concept's eternal and cyclical nature. For 10 points, name this concept that is recorded by observing the sun and moon by the Hindu calendar.**

ANSWER: **time** [or the wheel of **time**; or **kala**; **kalachakra** before "kalachakra"; accept **yugas** before "divisions"]

<Religion, Chen>

13. **In a 2018 book subtitled "Tilt of History," Steven Zipperstein documented the circumstances leading up to one of these events. The phrase "Hep! Hep!" was supposedly shouted by participants in one of these events that began in 1819 in Wurzburg. Outrage about these events led to one man proposing the Uganda Scheme. The stated purpose of a set of non-German (*) May Laws was to prevent these events. The Okhrana were responsible for perpetrating one of these events in Siedlce ("shed-luh-tse"). Articles published in the newspaper Bessarabetz sparked one of these events in Kishinev. In one empire, these events took place primarily in the Pale of Settlement. For 10 points, the Russian Empire facilitated what events, which were massacres of Jews?**

ANSWER: **pogroms** [accept descriptions involving massacres of Jews before mentioned; prompt on riots]
<European History, Nageswaran>

14. A quantity represented by this letter is defined as an integral over velocity space of P times $\log P$, where P is a single-particle distribution function. A quantity denoted by this letter decreases when molecules in a gas collide, bringing their velocities closer to a probability distribution co-named for Maxwell. Either this letter or its Greek equivalent lends its name to a theorem formulated by Ludwig (*) Boltzmann that attempted to prove the second law of thermodynamics, which inspired Claude Shannon's information entropy. Another quantity denoted by this letter can be given by the equation $U + p \times V$. A state function represented by this letter is used in the most common statement of Hess's law. For 10 points, name this letter used to denote the amount of enthalpy.

ANSWER: **H** [accept Boltzmann's **H** or **H**-theorem; accept eta before "Greek"]
<Physics, Zhang>

15. During a scene set in one of these locations, close-ups of Pieter Brueghel the Elder's *Hunters in the Snow* cut to a flashback of a girl starting a fire. The protagonist comments that "Guibariane did not die of fear, he died of shame" after witnessing the formation of a gyre from one of these locations. During a close-up of a character's eyes in one of these locations, (*) György Ligeti's *Atmospheres* begins to play. Kris Kelvin attempts to find the cause of suicides at one of these locations in Andrei Tarkovsky's film *Solaris*. In one of these locations, a character sings "Daisy Bell" as he is deactivated by David Bowman. HAL 9000 is a supercomputer in, for 10 points, what sort of location central to Stanley Kubrick's *2001: A Space Odyssey*?

ANSWER: **space stations** [accept Space Station V; prompt on spaceship or spacecraft]
<Other Fine Arts, Parameswaran>

16. *Description acceptable.* There is debate over whether the "Epistemic Condition" for this philosophical concept is actually the same as the "Control Condition." Instead of focusing on metaphysical questions of freedom, P. F. Strawson attempted to vindicate this concept using "reactive attitudes." Harry Frankfurt proposed a series of cases arguing against the Principle of Alternative Possibilities in relation to this concept. Thomas (*) Nagel classified 4 types of "Luck" that create situations with counterintuitive assignments of this concept. It is typically assumed that this moral concept requires free will, and therefore is threatened by incompatibilism and hard determinism. For 10 points, give this concept in which people's actions are judged to be morally praiseworthy or blameworthy.

ANSWER: moral **responsibility** [accept praise or blame before mention; accept moral accountability; accept descriptions like determining whether people are morally responsible for their actions or answers about moral guilt or condemnation]
<Philosophy, Berns>

17. The orchestrators of this event were assassinated by the nationalist Dashnak organization as part of Operation Nemesis. Before helping lead the Beer Hall Putsch, Otto von Lossow provided early reporting about this event. To raise money for this event's victims, Cleveland Dodge founded the ACASR at the urging of Henry Morgenthau Sr. While reporting for the *Agos*, (*) Hrant Dink was murdered in 2007 for discussing this event and violating one country's Article 301. The "Three Pashas" organized this event in response to accusations that a certain ethnic group was aiding the Russians in the Caucasus. For 10 points, name this mass killing of Christians of a certain nationality by Ottomans, an event still disputed by Turkey to this day.

ANSWER: **Armenian Genocide**
<World History, Nageswaran>

18. For *National Geographic*, Mike Hettwer photographed the remains of this region's Kiffian and Tenerian cultures. Rock art in the Cave of Swimmers and the Acacus Mountains suggest that humans inhabited this region as early as 10,000 B.C.E. Multiple meteorite impacts formed the concentric circles of this region's Aorounga Crater, which lies just south of the Tibesti Mountains. During the Neolithic Subpluvial, this region was home to a (*) megalake which covered the Bodele Depression, which now provides the majority of nutrients used to fertilize South America. A "Great Green Wall" is being built to stop this region's expansion, which has caused Lake Chad to decrease in size by 90%. For 10 points, name this large North African desert.

ANSWER: Sahara Desert [accept Maghreb; anti-prompt on Libya or Algeria; anti-prompt on Chad before "Chad"]
<Geography, Parameswaran>

19. This character claims she "trained herself" to only be aroused by men older than 42. A cat is thrown out of a limo by this character, who immediately regrets it when she realizes they "belonged to each other." This character tosses an ornate birdcage in the garbage after it is rejected as a Christmas gift. This character suffers a miscarriage after chasing the narrator through (*) Central Park on horseback. This character breaks down after finding out that her brother Fred died fighting in World War 2. This character flees to Brazil after being indicted for delivering "weather reports" for the gangster Sally Tomato. For 10 points, name this young socialite who appears in Truman Capote's novel *Breakfast at Tiffany's*.

ANSWER: Holly Golightly [or Holly Golightly]
<Long Fiction, Schwartz>

20. Materials for making these objects are classified as "ionic" or "non-ionic" and as high water content or low water content. Dk/t values quantify the permeability of these objects to oxygen. Improper usage of these objects is the most common iatrogenic cause of stromal neovascularization. Poly(methyl methacrylate) is the primary component of the rigid gas permeable, or "hard," type of these objects, while silicone-based (*) hydrogels compose their soft type. Formation of a fluid reservoir is necessary for the "scleral" type of these objects to function. In orthokeratology, these objects are worn overnight to adjust surface curvature, correcting conditions like myopia and astigmatism. For 10 points, name this corrective eyewear worn directly on the eye.

ANSWER: contact lenses [or contacts; accept specific forms of contacts like soft contacts and rigid gas permeable contacts; prompt on lenses]
<Biology, Chen>

Bonuses

1. This theory is thought to have 25 or 26 free parameters, including the g_3 coupling constant and the Weinberg angle. For 10 points,

[10h] Name this theory whose symmetries are specified by a $SU(3)$ product $SU(2)$ product $U(1)$ gauge group.

ANSWER: the **Standard Model** [or **SM**]

[10m] A "minimal" extension to the Standard Model accounting for this theory would resolve the hierarchy problem. This theory holds that each elementary particle has a partner with a spin that differs by one-half.

ANSWER: **supersymmetry** [or **SUSY**; or minimal **supersymmetric** Standard Model]

[10e] Experiments at this particle accelerator with a maximum collision energy of 13 teraelectronvolts have mostly falsified the minimally supersymmetric Standard Model. This particle accelerator is run by CERN.

ANSWER: **Large Hadron Collider** [or **LHC**]

<Physics, Chen>

2. William Shirer examined the "collapse" of this government in a book subtitled "An Inquiry into the Fall of France in 1940." For 10 points each:

[10m] Name this French government, which lasted from 1870 until France's occupation by Nazi Germany. Its last prime minister was the traitorous Pierre Laval.

ANSWER: French **Third Republic**

[10h] Before France completely fell apart, it achieved historic reforms under this left-wing government headed by Leon Blum. This government signed the Matignon Accords, which guaranteed a 40-hour work week.

ANSWER: **Popular Front** [or **Front populaire**]

[10e] The Popular Front fell apart over whether or not to intervene in this conflict, which saw Hitler send the Condor Legion. Francisco Franco established a fascist dictatorship following this conflict.

ANSWER: **Spanish Civil War**

<European History, Parameswaran>

3. Antonio Damasio proposed that this region is responsible for processing bodily sensations and emotions that guide decision making in the somatic marker hypothesis. For 10 points each:

[10h] Name this region of the cerebral cortex. The anterior regions of the cingulate cortex and this region control bodily interoception.

ANSWER: **insular** cortex [or **insular** lobe; or **insula**]

[10e] The gustatory cortex, which controls this sense, is located partially in the insular cortex. This sense is received by receptors called "buds" located on papillae.

ANSWER: **taste** [prompt on **gustation**]

[10m] The insular cortex also processes the magnitude of this phenomenon. A-delta and C type fibers conduct impulses that trigger this phenomenon to sensory neurons called nociceptors.

ANSWER: **pain** [prompt on **nociception**]

<Social Science, Chen>

4. The "breaths" and "machinations" of this poem's title place "[draw] their substance from the noise of the pouring river." For 10 points each:

[10h] Name this poem, which contains the line "Say it, no ideas but in things". Book IV of this poem focuses on the pollution of the Passaic River.

ANSWER: **Paterson**

[10e] This author noted that "man is himself a city" in the prefatory notes to *Paterson*. This New Jersey native wrote that "so much depends" upon the title object of his poem "The Red Wheelbarrow".

ANSWER: William Carlos **Williams**

[10m] This author noted "I would rather go mad, gone down the dark road" than "jar my body down the road" in his

poem "Paterson." This native of Paterson decried the madness-inducing "Moloch" in another of his poems.

ANSWER: Irwin Allen **Ginsberg** (The second poem is "Howl.")

<Non-Epic Poetry, Parameswaran>

5. A man dances with an axe in front of a snow-blanketed house in a Grandma Moses painting titled after this event.

For 10 points each:

[10m] Give this event, also depicted in a painting whose central figure is an old woman in an apron holding a platter.

Carlos Bulosan wrote an essay for that painting of this event, titled *Freedom From Want*.

ANSWER: **Thanksgiving**

[10e] This artist of *Freedom From Want* painted Grandma Moses among many others in his *Christmas Homecoming*, one of his many works for the *Saturday Evening Post*.

ANSWER: Norman **Rockwell**

[10h] Moses was partially inspired to paint after viewing prints made by this duo, then the largest printmaker in America. One of their prints, titled *Across the Continent*, depicts a railroad crossing a ford.

ANSWER: **Currier & Ives** [accept Nathaniel **Currier** and James Merritt **Ives**]

<Visual Fine Art, Zhang>

6. Though it is not kinesin, every class of this protein travels towards the plus end, except for its VI class. For 10 points each:

[10e] Name this protein that binds to actin during the cross-bridge cycle to drive muscle contractions.

ANSWER: **myosin**

[10h] The elasticity of muscles is the result of this protein, which contains several determined by its PEVK regions. This protein connects the Z disc to the M band of a sarcomere.

ANSWER: **titin**

[10n] The presence of many copies of a domain named for these proteins also contributes to the elasticity of titin. In humans, these proteins exist in 5 isotypes denoted A, D, E, G, and M.

ANSWER: **immunoglobulins** [or **Ig** domain; or **Igs**; accept **antibody** or **antibodies**]

<Biology, Hong>

7. Hugh Beaver was inspired to create this book after an argument over whether the golden plover was the fastest game bird in Europe. For 10 points each:

[10e] Name this yearly book created by an Irish brewery that collects, verifies, and publishes human feats and extreme natural occurrences.

ANSWER: **Guinness World Records** [accept **Guinness Book of Records** or **Guinness Book of World Records**; prompt on **Guinness**]

[10m] Guinness obtained a 9000 year lease of a brewery partly named for this figure. The Dublin neighborhood containing that brewery was a starting point for the pilgrimage to Santiago de Compostela along the "Way" of this figure.

ANSWER: **St. James** the Great

[10h] Both the Guinness logo and the Irish Coat of Arms are modeled on a harp held in the "long room" of the library of this institution. This institution also houses the manuscript of the Book of Kells.

ANSWER: **Trinity College** Dublin

<Other, Zhang>

8. A politician with this last name was president during the Palace of Justice siege, during which half of his country's supreme court justices were killed. For 10 points each:

[10h] Give this last name of Belisario, who ordered a ceasefire between his country's guerilla groups. Ingrid, a candidate from the Oxygen Green Party with this last name, was rescued in Operation Jaque ("HAH-kay").

ANSWER: **Betancur** [or **Betancourt**; accept Belisario **Betancur** or Ingrid **Betancourt**; the names are pronounced

the same in Spanish.]

[10e] Belisario Betancur ("BET-ahn-coor") called for peace talks between FARC and M-19 in this country. Its president Juan Manuel Santos won the 2016 Nobel Peace Prize.

ANSWER: **Colombia**

[10m] This leader ordered a failed assassination against Rómulo Betancourt ("BET-ahn-coor"), Venezuela's president. This leader ordered the assassination of the Mirabal Sisters.

ANSWER: Rafael Leónidas **Trujillo** Molina [prompt on "El Jefe"]

<World History, Zhang>

9. These things were proposed by Alfred Watkins to follow ancient trade routes. For 10 points each:

[10h] Name these supposed patterns that connect important man made structures and are believed to carry supernatural energy by the Earth mysteries movement.

ANSWER: **ley** lines

[10e] Many ley lines are associated with this landmark near Salisbury. In Arthurian legend, giants helped Merlin create this landmark by transporting and erecting monoliths from Ireland.

ANSWER: **Stonehenge**

[10m] These Celtic priests held ceremonies at Stonehenge during the summer solstice. In one ritual, a white-clad one of these figures involved climbing an oak and cutting down its mistletoe to make a cure for infertility and poison.

ANSWER: **druids**

<Mythology, Zhang>

10. After a fire burns the house of the Blackwoods in a novel by this author, it is described as "turreted, and open to the sky." For 10 points each:

[10e] Name this author who wrote about Mary Katherine and Constance in *We Have Always Lived in the Castle*. She also wrote short stories like "The Lottery."

ANSWER: Shirley **Jackson**

[10h] Merricat Blackwood checks on her buried items like silver dollars and some of these things on Sundays. In a different novel, a reclusive character leaves two of these things made of soap inside a tree whose hole is later filled up.

ANSWER: **dolls** [or **figurines**; the character is Boo Radley from *To Kill a Mockingbird*.]

[10m] In this other novel by Jackson, Eleanor Vance is seemingly possessed by the title structure, only snapping out and wondering "why don't they stop me?" before driving into a tree.

ANSWER: The ***Haunting of Hill House***

<Long Fiction, Zhang>

11. Herodotus claimed that couriers travelling along this thing were not stopped by "snow nor rain nor heat nor gloom of night". For 10 points each:

[10m] Name this highway built by Darius I, which ran from Susa to Sardis. This highway contained mud brick stops known as chapar khaneh, which were used by couriers to change horses.

ANSWER: **Royal Road**

[10e] While travelling along the Royal Road, this general passed through the infamous Cilician Gates. This Macedonian general used the Royal Road to quickly mobilize troops during his invasion of Persia.

ANSWER: **Alexander** the Great [or **Alexander** III of Macedon]

[10h] The Royal Road inspired this Roman courier service established by Augustus. Travellers along this system were required to carry a *diploma* to receive passage.

ANSWER: **cursus publicus**

<World History, Hong>

12. In a short story by this author, a character feels like "the first man on earth" because he's "hardly got a stitch on."

For 10 points each:

[10h] Name this author of a short story whose protagonist intentionally loses a competition because a "pot-bellied pop-eyed" governor views him like a "race-horse."

ANSWER: Alan **Sillitoe**

[10m] The bleakness of Sillitoe's narrator in "The Loneliness of the Long-Distance Runner" was considered representative of this 1950's literary movement. The "kitchen sink realism" of a John Osborne play originated the name of this movement.

ANSWER: **Angry Young Men**

[10e] "The Loneliness of the Long-Distance Runner" is set at a "borstal" in this country's city of Essex. The "Angry Young Men" movement originated in this country.

ANSWER: **England** [accept **United Kingdom**]

<Short Fiction/Other, Martin>

13. The sum of the squares of independent standard normal random variables has this distribution. For 10 points each:

[10e] Name this distribution. Karl Pearson developed tests for goodness of fit, homogeneity, and independence that compare against this distribution.

ANSWER: **chi-squared** distribution

[10h] The ratio of two chi-squared distributions follows this other distribution. In a one-way ANOVA, the statistic for this test can be found by variation between samples divided by variation within samples.

ANSWER: **F** distribution [accept **F-test**]

[10m] The chi-squared and F distributions both have this property of being defined on an uncountable set such as the positive real numbers. This type of distribution is contrasted with a discrete distribution.

ANSWER: **continuous** distribution

<Math, Zhang>

14. Daniel Fish's 2019 Broadway revival of this musical served cornbread and chili to audience members during intermission. For 10 points each:

[10m] Name this Rodgers and Hammerstein musical about Curley's attempts to woo Laurey, much to the chagrin of the incel farmhand Jud.

ANSWER: **Oklahoma!**

[10e] In this opening number from *Oklahoma!*, Curley energetically proclaims that he's "got a beautiful feeling / everything's going [his] way." The melody of this song features prominently in the musical's "dream ballet."

ANSWER: **"Oh What a Beautiful Morning"**

[10h] In the 2019 Broadway revival, the promiscuous Ado Annie was played by Ali Stoker, a performer with this condition. Stoker subsequently became the first person with this condition to win a Tony.

ANSWER: she's **paralyzed** from the waist-down [accept "she uses a **wheelchair**" and equivalents]

<Fine Arts, Schwartz>

15. According to one book, scientific crises emerge when a paradigm can no longer provide tools for this metaphorical activity to rectify "anomalies." For 10 points each:

[10h] Name this activity. Thomas Kuhn compares scientific research done between periods of revolution to this activity in *The Structure of Scientific Revolutions*.

ANSWER: **puzzle-solving** [prompt on normal science by asking "What activity is normal science compared to in the book?"]

[10m] Kuhn defines the capacity for puzzle-solving as one criterion for solving this problem, which attempts to distinguish between science and non-science.

ANSWER: **demarcation** problem

[10e] Kuhn uses the example of puzzle-solving in a revolution began by Copernicus in this field of science to

distinguish it from pseudoscience like astrology.

ANSWER: **astronomy**

<Philosophy, Zhang>

16. A composer's opuses 96 and 98, the first in A major and the second in F major, both share this adjective in their names. For 10 points each:

[10m] Give this adjective. Harry Burleigh may have inspired the start of a string quartet titled for this adjective, in which a viola plays a pentatonic melody over an oscillating violin and cello.

ANSWER: **American** [accept **American Suite** or **American String Quartet**]

[10e] This Czech composer wrote the *American Suite* and string quartet. His time in America also inspired his Symphony No. 9 "From the New World."

ANSWER: Antonín **Dvořák**

[10h] The *Moderato alla polacca* third movement of the *American Suite* is a rondo that uses a 16th note, 32nd rest, 32nd note figure, like the seventh one of these works by Dvořák in G-flat major.

ANSWER: **humoresques**

<Auditory Fine Arts, Zhang>

17. Answer the following questions about chemical species that exhibit fluxionality:

[10m] One textbook example of fluxionality is the Berry pseudorotation of phosphorus pentafluoride, which according to VSEPR theory, exhibits this type of molecular geometry.

ANSWER: **trigonal bipyramidal**

[10h] Another example of fluxionality is the spontaneous tendency for certain symmetric pi systems to undergo this reaction. This [3,3]-sigmatropic rearrangement includes a transition state of six carbon atoms.

ANSWER: **Cope** rearrangement

[10e] Chemical reactions causing fluxionality typically have low values for this quantity, allowing for rapid chemical exchange. This quantity is typically interpreted as the minimum energy needed for a reaction to occur.

ANSWER: **activation** energy

<Chemistry, Tong>

18. In one play, a man puts the end of one of these items in his mouth before putting it into his jacket pocket and going backstage to uncork a bottle. For 10 points each:

[10h] Name these items. In that one-man play, a man listens to a recording of himself from 30 years ago saying that he "only with difficulty restrained" himself from "a fourth" one of these items.

ANSWER: **bananas** (The play is *Krapp's Last Tape*.)

[10m] In a different play by the author of *Krapp's Last Tape*, Vladimir complains that Pozzo will "chuck [this servant of his] away like a banana skin." This character delivers a rambling monologue that is stopped when his bowler hat is removed.

ANSWER: **Lucky** (The play is *Waiting for Godot*)

[10e] This absurdist playwright wrote *Krapp's Last Tape* and *Waiting for Godot*.

ANSWER: Samuel **Beckett**

<Drama, Zhang>

19. Answer the following about the end times according to Islam. For 10 points each:

[10h] Dhul-Suwayqatayn is the belief that men from this country will destroy the Kaaba in a sign of the end times. This country was the home of Bilal ibn Rabah, the first muezzin.

ANSWER: **Ethiopia**

[10e] Prior to the arrival of Jesus in the end times, a "false" one of these figures will ravage Earth for 40 days. These people are worshipped as saviors of believers in Abrahamic religions.

ANSWER: **Messiah** [or **Massih**]

[10m] Following the end times, verse 62 of Surah Al-Baqarah claims that these people "shall have their reward" with Allah, despite not fully believing in Islam. The Qu'ran uses this term to refer to Jews, Christians, and Sabaeans.

ANSWER: **People of the Book** [or **ahl al-Kitab**; accept **dhimmi**]

<Religion, Parameswaran>

20. Upon hearing of the results of this alleged agreement, one man wrote that "the Judas of the West has closed the contract and will receive the thirty pieces of silver." For 10 points each:

[10m] Name this two-word phrase used by Andrew Jackson to explain his loss in the Election of 1824.

ANSWER: "**corrupt bargain**"

[10e] Jackson's supporters alleged that John Quincy Adams appointed this man as Secretary of State after he helped him win the Election of 1824. This Kentucky senator was known as the "Great Compromiser."

ANSWER: Henry **Clay**

[10h] Although Quincy Adams was largely ineffectual in office, he oversaw the construction of this first passenger railroad in the United States. Workers on this railroad began the 1877 Great Railroad Strike.

ANSWER: **Baltimore and Ohio** Railroad [or **B & O** Railroad]

<American History, Nageswaran>