

*UC Berkeley's WIT 7: Packet by UCSB (Zach Teitler, Richard Blair, Mark Brinkman, Ben Segal, Dana Terry)*

### Tossups

1. Two brothers, George and Harry Warrington, fight on opposite sides in the American Revolutionary War in this author's *The Virginians*. Also the author of *Pendennis* and *The Fitz Boobles Papers*, his wife went mad after the birth of his third daughter, making Charlotte Brontë's choice to dedicate *Jane Eyre* to him somewhat inappropriate. FTP, who was this author of *The History of Sir Edmond, Esquire and Vanity Fair*?

Answer: William Makepeace Thackeray (accept "*The Virginians*" before "this author's.")

2. Leased to Germany in 1898 as part of the Kiaochow territory, it became the administrative center of the leasehold and developed into a modern city. This large port city lies on the Yellow Sea across from Korea at the edge of the Shaoting province peninsula, but is perhaps best known to Americans for a beer brewed there. FTP what is the T-initialled city?

Answer: Tsingtao or Ch'ing-tao or Qingdao

3. Growing up, this novel's protagonist views love and life as a beautiful pear tree that grew in her grandmother's yard, but, as she tells her friend Phoeby, this image is destroyed by her loveless marriage to landowner Logan Killicks. The protagonist then leaves Killicks to marry Joe Starks, who treats her like property when he becomes mayor. When Starks dies, she enters a happy relationship with a young roustabout which turns sour when he gets rabies and attacks her. FTP, name this novel whose main character is Janie Crawford, written by Zora Neale Hurston.

Answer: Their Eyes Were Watching God (prompt on early buzz of "Janie Crawford")

4. A baroque painter, he was given a lifetime appointment as court painter to the Spanish governors of the Netherlands. Influenced by Veronese, Titian, and Tintoretto, his works include mythological, allegorical, and religious subjects, as well as portraits, especially of his wife. FTP, who was this energetic and brilliant Flemish artist whose most famous paintings include *The Rape of the Sabines*, *Venus and Adonis*, a self-portrait, and *Christ on the Cross*?

Answer: Sir Peter Paul Rubens

5. It consists of two polypeptide chains, one of 21 amino acids, the other of 30, synthesized in the beta cells. These two chains are joined together by two disulfide bridges. The first protein to be sequenced entirely, it stimulates the conversion of glucose to glycogen in muscles. FTP, what is this hormone secreted by the islets of Langerhans, a deficiency of which results in diabetes?

Answer: Insulin

6. It ends ominously: "And it is this which frightens me: Who knows but that, on the lower frequencies, I speak for you?" The nameless narrator is duped by many people, many times. The headmaster of his former college writes letters of condemnation instead of letters of recommendation. He believes that a mixed-race band of social activists called "The Brotherhood" are fighting for equality, only to find violence and confusion. FTP, what is this 1952 milestone in American literature written by Ralph Ellison?

Answer: Invisible Man

7. It seems that some later editor divided the most famous of his writings into nine books, named for each of the Muses. Living in the 5th century BC, he wildly digresses into the histories of Babylon, Thrace, and Egypt, as well as detailed studies of the pyramids in his most famous work. FTP, who is this person, the first writer to evaluate historical, geographical, and archaeological material in his secular and comprehensive history of the Persian Wars?

Answer: Herodotus

8. Although it probably contains a rocky core, its apparent atmosphere is comprised of 71% hydrogen, 24% helium, and 5% other elements. With the fastest rotation of all the planets, it is noticeably flattened into an

oblate shape. Although not massive enough to become a brown dwarf, the mass of this planet is so great it emits its own heat. FTP, name this fifth planet from the sun.

Answer: Jupiter

9. Every July 12, the Orangemen go out in Northern Ireland to celebrate a battle fought near Drogheda. The battle took place shortly after the Glorious Revolution, and quelled Stuart ambitions to recover to the throne. FTP, name this battle fought in Ireland in 1690 in which the armies of William of Orange defeated those of Catholic James II.

Answer: Battle of the Boyne

10. She witnessed her mother's slow death, after 18 pregnancies and 11 live births. While working as a nurse and midwife in the poorest neighborhoods of New York City in the years before WWI, she saw women deprived of their health, sexuality, and ability to care for children. This injustice inspired her to defy church and state in a series of articles entitled "What Every Girl Should Know." FTP, who is this leader in American birth control?

Answer: Margaret Sanger

11. He was the son of the warrior Antipater, and was a lieutenant of Marc Antony. When Antony fell to Augustus, he showed himself adaptable, and was appointed King of Judaea, Idumea, and whatever else he could conquer. FTP, who is this person that conquered Jerusalem in 37BC, perhaps better known for being the ruler during Jesus' birth?

Answer: Herod

12. In Greek mythology, she was the princess of Argos, but she has also been identified with the Egyptian goddess Isis. Like many women in Greek mythology, she had an amorous adventure with Zeus. Hera, in a fit of anger, sent the many-eyed creature Argus to watch over her, but Argus was eventually killed by Hermes. This allowed her to escape, but not before Hera had a gadfly torment her as she fled through Europe and Asia. FTP, who is this person who tried to hide from Hera in the form of a cow?

Answer: Io

13. In 1999, a special Pulitzer Prize award was bestowed posthumously to him, commemorating the centennial year of his birth. However, he was turned down in the 1960's because jazz was considered undignified. Although he played piano, it was said that his main instrument was his band. FTP, name this composer of Black, Brown and Beautiful, Don't Get Around Much Any More, and Mood Indigo.

Answer: Edward Kennedy "Duke" Ellington

14. Literally, their name means "8, 9, 3," a losing hand from a once popular card game. Although used as a derogatory term for gangsters, gamblers, and good-for-nothings, the actual groups are famous for their tattoos and elaborate codes of honor and behavior. They are also often associated with right-wing politics and have taken part in attacks on protesters, as well as blackmail, drugs, and bodily injury. FTP, what are these gangsters involved in organized crime in Japan?

Answer: Yakuza

15. Originally a Benedictine monastery, it was refounded as the Collegiate Church of St. Peter. The western towers were the last additions, and are usually said to have been designed by Sir Christopher Wren. Since William the Conqueror, every British sovereign, except for Edward V and Edward VIII, have been crowned here. FTP, what is this place that also contains the grave of the "Unknown Warrior," memorials to British statesmen, as well as Poet's Corner?

Answer: Westminster Abbey

16. In 1979, the Diffie-Hellman algorithm was published, the first published description of this type of system, although the National Security Agency claims to have created one earlier. They can be used for authentication, message authentication, and secrecy, but are generally slow and require the equivalent of white pages to look up information on individuals. FTP, what is this general class of encryption software that has one key known only to the owner, and another published and available to everyone, of which RSA is the best known?

Answer: Public-key Cryptography (prompt on encryption or cryptography)

17. Dr. Josef Mengele, General Douglas MacArthur, F. Scott Fitzgerald, Sam Bowden, Captain Ahab, Ambrose Bierce, Pa Baxter, and Atticus Finch are all roles this California-born actor has portrayed. FTP, name this actor that starred in *Gentleman's Agreement*, *The Boys from Brazil*, and *To Kill a Mockingbird*.

Answer: Gregory Peck

18. This body of water has an extremely low salinity due to the fresh water it receives from such rivers as the Oulu, Kemi, and Angerman. Nearly closed off from the sea that neighbors it to the south by the Aland Islands, it is about 5 times longer north-to-south than east-to-west and is covered by ice for up to five months during the winter. FTP, name this northern arm of the Baltic Sea lying between Finland and Sweden.

Answer: Gulf of Bothnia (prompt on "Baltic Sea" before the word "sea" in the second sentence)

19. In 1871, the unification of Italy was completed by restricting the papal sovereignty to a few buildings. However, the Roman Catholic Church never recognized this arrangement, with the popes considering themselves prisoners in the Vatican. These problems, known as the Roman Question, were finally settled in 1929, through the creation of the Vatican City as an independent state; the establishment of Catholicism as Italy's state religion; and large financial compensation to the church for the loss of the Papal States. FTP, what was this 1929 treaty signed by Mussolini and Pope Pius XI?

Answer: Lateran Treaty

20. A dilettante and scholar, the Platonic dialogue Euphranor and the collection of aphorisms entitled Polonius are among his other works. His masterpiece was a translation that appeared anonymously in 1859, and passed unnoticed until Dante Gabriel Rossetti made it famous. FTP, who is this English man of letters, who was the author of the English version of The Rubaiyat of Omar Khayyam?

Answer: Edward Fitzgerald

21. Born in 1891, this English physicist was knighted in 1945 after winning the 1935 Nobel Prize in physics. FAQTP, who received these awards for discovering the neutron?

Answer: Sir James Chadwick

22. This two-word term applies especially to expatriate American authors. Coined by Gertrude Stein, it refers to alienated and disillusioned authors such as Hemingway and Fitzgerald, who though they knew the way home stayed in Paris. FTP what is this term for those whose ideals had evaporated?

Answer: Lost Generation

23. At about the time of American Revolution, a great revolt broke out in Peru and rebels twice nearly took Cuzco. Attempts to secure British and French aid failed, but thousands of Indians joined the rebel leader, a descendant of the Inca rulers. FTP, who challenged the Spanish from 1780-82?

Answer: Tupac Amaru

24. Often imposed by the government, Diocletian and Nixon both tried it. This two-word term is a limit often instituted to try to guarantee that customers will be able to afford necessary goods. FTP what is this artificial limit placed on costs?

Answer: Price Ceiling

25. In the geocentric model of the solar system, what name was given to the system of circles within circles within circles that were invented to explain the apparent motions of the planets?

Answer: Epicycles

26. A contraceptive, it is a bent plastic or metal coil or loop which when inserted into a woman functions to prevent pregnancy. Although it is effective if inserted by an experienced physician, complications such as infection can arise, so this device is rarely if ever used nowadays. FTP, what do the initials IUD stand for?

Answer: Intrauterine Device

## Bonus Questions

1. Answer the following about an architect, FTP each:

a) This architect's more famous works include the multi-airline terminal at Kennedy Airport and a glass pyramid in one of the courtyards of the Louvre.

Answer: I(eoh) M(ing) Pei

b) One of Pei's most noted works is the East Building of this Washington, D.C., museum, which he completed in 1978.

Answer: National Gallery of Art

c) One of Pei's more recent buildings is this one, located in Cleveland, which was completed in 1995.

Answer: Rock and Roll Hall of Fame and Museum

2. Having finished reading the Cartoon Guide to Statistics, this author has been inspired to write some questions on probability. Answer each part for ten points each.

a) It can be roughly thought of as the average distance of each data point from the mean, and is derived by calculating the square root of the variance.

Answer: Standard Deviation

b) Within 10% for 5 points and within 2% for 10, approximately how much of the data is within one standard deviation of the mean for nearly symmetric mound-shaped data sets?

Answer: 68% (66%-70% for 10 points, 58%-78% for 5 points)

c) Conceptually similar to standard deviation, it also measures the spread of data. First you take the median, and then take the median of the top half, denoted Q3, and the bottom half, denoted Q1. This value is defined as Q3 minus Q1. For ten, give the name or the three letter acronym.

Answer: Interquartile Range (IQR)

3. Answer the following about paradoxes in quantum mechanics for the stated number of points.

a) (5) Place an animal inside a box along with a vial of poisonous gas. The gas is released when an atom of radioactive material decays. Classical physics says the animal is either alive or dead, quantum physics says it is simultaneously alive and dead.

Answer: Schrodinger's Cat

b) (10) This is a process in quantum mechanics that allows an electron to escape from a metal without acquiring the energy required along the way according to the laws of classical physics

Answer: Electron Tunneling

c) (15) Niels Bohr proposed this orthodox interpretation of quantum phenomena, in which no reality can be ascribed to the microscopic world. Quantum mechanics is a complete theory and an ultimate and final reflection of the real world. For fifteen, name it..

Answer: Copenhagen interpretation

4. Answer the following about the Dreyfus affair.

a) (5) Name the open letter written by Emile Zola in 1898 which accused the French army of covering up its mistaken conviction of Dreyfus.

Answer: J'Accuse (I Accuse)

b) (10) Name the man who was actually guilty of the crimes ascribed to Dreyfus but fled to England.

Answer: (Marie-Charles-)Ferdinand Walsin Esterhazy

c) (15) To which then-president of France was J'Accuse addressed?

Answer: (François-)Félix Faure

5. Answer the following about the Boston Massacre.

a) For five points, what year did it occur?

Answer: 1770

b) For ten, what was the name of the black and Indian American who was the first of five men to die?

Answer: Crispus Attucks

c) For another ten points, what was the name of the captain that led the British troops?

Answer: Thomas Preston

d) For a final five, name either of the two lawyers that defended Thomas Preston and his troops.

Answer: John Adams or Josiah Quincy

6. Name the Shakespeare play from characters who die, 10-5.

a) (10) Jacques, Silvius

(5) Rosalind, Touchstone

Answer: As You Like It

b) (10) Voltemand, Osric

(5) Rosencrantz

Answer: Hamlet

c) (10) Curan, Oswald

(5) Goneril, Regan

Answer: King Lear

7. Answer the following about the East-West Schism, which led to the final split between the Eastern and Western churches:

a) FTP if exact and for 5 points if within 25 years, when did the Schism take place?

Answer: 1054

b) FFP each, name the Roman pope and the patriarch of Constantinople whose mutual excommunications resulted in the schism.

Answer: Pope Leo IX and Patriarch Michael Cerularius

c) FTP, name the 1439 council at which the western church unsuccessfully tried to heal the Schism.

Answer: Council of Ferrara-Florence

8. Given a list of three mathematical terms, put them in order of most restrictive category to most inclusive. That is, they should fit into the sentence "Every A is a B, and every B is a C". You will get five points for each correct placement.

a) Abelian group, monoid, cyclic group.

Answer: cyclic group, abelian group, monoid

b) Real analytic function, continuous function, C-infinity function.

Answer: real analytic function, C-infinity function [accept smooth function], continuous function

9. Answer the following about colloids.

a) This is the process of selective diffusion of ions and molecules through a semipermeable membrane, which retains colloid particles and macromolecules. One sample use includes desalination.

Answer: Dialysis

b) It is a suspension of small liquid or solid particles in a gas, examples of which include smoke, fog, and clouds. Most containers use some sort of propellant.

Answer: Aerosols

c) The effect describing how light is scattered by colloidal particles in a suspension is named for this British physicist, who showed that Rayleigh scattering of sunlight by dust and other particles causes the blue sky.

Answer: Tyndall effect (named after John Tyndall)

10. Name the British artists from works on a 10-5 basis:

a) (10) *Marriage à la Mode*, *The Painter and his Pug*

(5) *The Rake's Progress*

Answer: William Hogarth

b) (10) *Mr. and Mrs. Andrews*, *The Morning Walk*

(5) *The Blue Boy*

Answer: Thomas Gainsborough

c) (10) *Christ in the House of his Parents*, *The Order of Release*

(5) *The Return of the Dove to the Ark*, *The Blind Girl*

Answer: Sir John Everett Millais

11. Name these female characters from the *Odyssey*, FTP each:

a) First she turned his men into swine, but when he resisted her magic, the two made love. Odysseus came to like her so much he stayed with her a whole year and only left when his men made him.



Answer: Circe

b) She kept Odysseus for seven years after he was shipwrecked on her island, Ogygia. Despite her offers of immortality and eternal youth, Odysseus spent his time on the seashore weeping.

Answer: Calypso

c) She rescued Odysseus when he washed up in the land of the Phaeacians. Some think *she* wrote the *Odyssey*.

Answer: Nausicaa

12. Answer these questions about prohibition, FTP each:

a) In 1838 this state passed a law prohibiting the sale of spirits in less than 15-gallon quantities, but the law was repealed two years later.

Answer: Massachusetts

b) The first state prohibition law was passed in this state in 1846.

Answer: Maine

c) This act, named for the Minnesota congressman who introduced it and enacted on October 18, 1919, gave enforcement guidelines for the 18th Amendment

Answer: Volstead Act (or National Prohibition Act)

13. Name these almost-invulnerable heroes for the stated number of points.

a) (5) This Greek hero was dipped by his mother, Thetis, into the River Styx, by which he became invulnerable, except for his heel, where she held him.

Answer: Achilles

b) (10) This husband of Eos was granted immortality by Zeus, but was not given eternal youth, so he grew old and was transformed into a cicada.

Answer: Tithonus

c) (15) It was prophesied that this actual Swedish king could only be hit by a bullet made from one of his own buttons. He won many great battles before being shot at the siege of Fredrikshald, possibly by someone from his own side.

Answer: Charles XII

14. Name the author who wrote in German from works, FFP each:.

a) *The Flounder* and *Cat and Mouse*

Answer: Gunter Grass

b) *Duino Elegies* and *Sonnets to Orpheus*

Answer: Rainier Maria Rilke

c) *Buddenbrooks* and *Mario and the Magician*

Answer: Thomas Mann

d) *Mother Courage And Her Children* and *The Threepenny Opera*

Answer: Bertolt Brecht

e) *The Weavers* and *Before Dawn*

Answer: Gerhart Hauptmann

f) *Hymns to the Night* and *Heinrich von Ofterdingen*

Answer: Novalis (pen name of Friedrich Leopold, baron von Hardenburg)

15. Given the molecule, tell how many carbon-hydrogen bonds it has. You have ten seconds per part.

a) For five points, propane                      Answer: 8

b) For five points, methane                      Answer: 4

c) For ten points, cyclohexane                      Answer: 12

d) For ten points, ethyne                      Answer: 2

16. Answer the following questions about linguistics for the stated number of points.

a) Name the man whose 1957 book *Syntactic Structures* revolutionized theoretical linguistics and who also wrote *Aspects of the Theory of Syntax, Language and Mind*, and *Reflections on Language*.

Answer: (Avram) Noam Chomsky

b) This term, developed by Chomsky, refers to a precisely formulated set of rules whose output is precisely the sentences of the language it generates. One example is what Chomsky referred to as transformational grammar.

Answer: Generative grammar

c) Chomsky distinguished between two kinds of structure in sentences: "deep structure" refers to the underlying meaning of a sentence, while this refers to the actual words and sounds used.

Answer: surface structure

17. Name the musician, 30-20-10.

a) (30) Drafted into the German army in 1917, he played the bass drum in the regimental band. After the war, he led the *Gebrauchsmusik*, or "utility music," movement.

b) (20) This viola player's works include the scandalous one-act opera *Sancta Susanna*, dealing with the sexual fantasies of a nun, and seven works entitled *Kammermusik*, marking a movement toward a neoclassical or neo-Baroque style.

c) (10) The Nazi regime banned performance of his 1934 opera *Mathis der Maler*, ultimately causing him to move to America, where he wrote *Ludus Tonalis* and *Symphonic Metamorphosis of Themes by Carl Maria von Weber*.

Answer: Paul Hindemith

18. Identify the following parts of Greek theaters, FTP each:

a) Members of the chorus sang and danced in this area.

Answer: Orchestra

b) Audience members would watch the performance from this area.

Answer: Theatron

c) This area was directly behind the skene and terrace wall.

Answer: Sanctuary of Dionysius

19. Identify the following physicists, FTP each

a) Independently of George Fitzgerald, he first proposed that moving objects contract along their direction of motion, an idea later incorporated by Einstein into the theory of special relativity. His prediction of the Zeeman effect won him a Nobel prize.

Answer: Hendrik Antoon Lorentz

b) He and James Franck experimented with, among other things, electron bombardment on mercury vapor, demonstrating the quantum nature of energy transfer and corroborating the Bohr model of the atom. Later he helped the USSR develop atomic weapons.

Answer: Gustav Hertz (not Heinrich Hertz)

c) His diverse contributions to physics include a theoretical explanation of superfluidity in Helium, but he is best known as the co-author of a nine-volume *Course in Theoretical Physics* with E.M. Lifschitz. He was declared clinically dead several times after a 1962 auto accident but did not die until 1968.

Answer: Lev Davidovich Landau

20. Answer the following questions about a recently-published biography, FTP each:

a) This Pulitzer-winning biographer recently got into hot water by creating a fictional character with his name and inserting it into the life of his subject.

Answer: Edmund Morris

b) The subject of Morris's work, this American president was the first sitting president to authorize a biography. According to Morris, one of his pet projects was inspired by the Edgar Rice Burroughs novel, *A Princess of Mars*.

Answer: Ronald Reagan

c) Give the title of this controversial biography.

Answer: Dutch: A Memoir of Ronald Reagan

21. Have you been to the library lately? Maybe it had a new-fangled computer index, but this isn't a computer question. Name these old-fangled indexing systems for the stated number of points.

a) (5) It was based on W.T. Harris's classification for the St. Louis Public Library and first formulated in 1873 for the Amherst College Library.

Answer: Dewey Decimal System or Dewey Decimal Classification

b) (10) Developed at the turn of the 20th century by Herbert Putnam, the then-Librarian of Congress, it rejects the decimal notation of the Dewey system in favor of a combination of letters and numbers. Putnam left blank spaces where he expected new subjects to develop.

Answer: Library of Congress system

c) (5) This scheme developed in China structures knowledge according to Marxist philosophy. It is distinguished by its detailed analysis of, and dependence on, Marxist literature. Unsurprisingly, it is little used in the West.

Answer: Marxist system

d) (10) This system, developed in 1933 by S. R. Ranganathan, has influenced all of classification theory despite only being used in a few Indian libraries. Ranganathan's five categories of abstract notions: personality, energy, matter, space, and time, form the basis of classification in this punctuation-named system.

Answer: Colon system

22. In 1066 England had 3 kings. FTPE name them.

Answer: Edward the Confessor, Harold II, William I

23. Let's see how much you know about the British Invasion, and I don't mean the War of 1812! Name the British rock groups from songs, 10-5.

a) (10) Only a Northern Song, Everybody's Got Something To Hide Except For Me And My Monkey.

(5) Sergeant Pepper's Lonely Hearts Club Band, Let It Be

Answer: Beatles

b) (10) Misty Mountain Hop, Dazed and Confused

(5) Kashmir, Stairway To Heaven

Answer: Led Zeppelin

c) (10) Toad, Born Under A Bad Sign

(5) White Room, Sunshine of Your Love

Answer: Cream

24. Given the alphanumeric classification, name the American World War II war plane, for the stated number of points.

a) (5) P-51

Answer: Mustang

b) (5) B-17

Answer: Flying Fortress

c) (10) SBD

Answer: Dauntless

d) (10) PBV

Answer: Catalina

25. Given a philosophical work, name its author FTPE.

a) *Meditations*

Answer: Rene Descartes

b) *On the Heavens*

Answer: Aristotle

c) *On Justice*

Answer: Plato

26. If you draw a line segment from each vertex of a triangle to the midpoint of the opposite side of the triangle, the three segments meet at the triangle's centroid. Name these other special points FTPE.

a) The intersection of the bisectors of the angles at the vertices of the triangle, this point is the center of the triangle's inscribed circle.

Answer: Incenter

b) Through each vertex of the triangle, make a line perpendicular to the opposite side. These three lines, called altitudes, intersect in this point, which might lie outside the triangle.



Answer: Orthocenter

c) Make the perpendicular bisector of each side of the triangle. They intersect in this point, the center of the triangle's circumscribed circle. Like the orthocenter this point might lie outside the triangle.

Answer: Circumcenter

27. Identify these early forms of humans, ten points each.

a) Proficient hunters, they were a subspecies of Homo sapiens. It is still debated whether they were driven to extinction by modern humans or their genes were intermixed with humans.

Answer: Neanderthal

b) Discovered in 1974, this is the nickname for the oldest Australopithecus afarensis skeleton. The name is also used in a song by the Beatles.

Answer: Lucy

c) Their skeletal remains have been found in southern France. Anatomically, they differ from Neanderthals, who disappeared shortly after the appearance of this early form of Homo sapiens.

Answer: Cro-Magnon.

28. Is your head in the clouds? Answer these cloud questions for ten points each.

a) This highest family of common clouds, commonly found at heights of 5 to 13 km, includes three species: fibratus, spissatus, and uncinus.

Answer: Cirrus

b) This rare cloud form occurs at an altitude of about 82 km and is visible only in high latitudes on summer nights, whence its name. It is silvery or bluish white and thought to be composed of ice crystals and meteoric dust.

Answer: Noctilucent cloud.

c) This is the general term for a cloud formed by the ascent of air over hills and mountains.

Answer: Orographic cloud

29. Name the taxonomic category, 30-20-10.

a) (30) Its genera include Sulfolobus, Methanopyrus, and Thermoplasma.

b) (20) It includes some Hyperthermophilic members, studied by J. Craig Venter and Everett Shock, which cause bright coloration near volcanic vents and geysers.

c) (10) This most primitive group of organisms on earth was recently separated from Bacteria into their own prokaryotic domain.

Answer: Archea or Archaeobacteria (accept Hyperthermophiles or Extreme thermophiles on the 30 point clue only)

30. Identify the crystal systems FTPE.

a) These crystals have three mutually perpendicular axes of equal length. Common forms include the tetrahedron, the octahedron, the dodecahedron, and the trapezohedron.

Answer: Cubic

b) These crystals have four axes, three of which are of equal length and intersect at 60 degree angles within a plane, and the fourth of which is perpendicular to the plane of the other three. Examples include beryl, corundum, and tourmaline.

Answer: Hexagonal

c) These crystals have three axes, all of unequal length and intersecting at angles other than 90 degrees. Examples include labradorite and microcline feldspar.

Answer: Triclinic