2022 Reinstein Set – Packet 4

Tossups

1. A device that changes this quantity in an electrical signal is a combination of a rectifier and an inverter. A non-linear electrical circuit called a mixer is sometimes named for the fact that it mixes two values of this quantity. Using the most common unit for this quantity, it has a value between about 20 and 20,000 for audible sound. Albert Einstein explained the photoelectric effect by describing a photon's energy as proportional to this quantity. The speed of a wave is the product of the wavelength and this quantity. Name this quantity of waves that is the reciprocal of period and which is measured in hertz ["hurts"].
Answer: **frequency** [prompt on **hertz**]

2. One of this author's characters likes to fly kites and works on a memorial speech that refers to King Charles I. This author has that character, who is called Mr. Dick, help Dr. and Annie Strong with their marriage. Dr. Strong heads a school that this author's title character attends after leaving a school headed by Mr. Creakle. In another novel by this author, two characters who look nearly identical are named Sydney Carton and Charles Darnay. This author began that novel "It was the best of times, it was the worst of times." Name this author of *David Copperfield* and *A Tale of Two Cities*.
Answer: Charles (John Huffam) **Dickens**

3. Microbiology in these locations has been studied by Hazel Barton, particularly in Naj Tunich [nah TOO-neech] in Guatemala. Animals that live in these locations are called troglobites [TRAHG-loh-"bites"]. These places are often caused by the dissolving of limestone or dolomite [DOH-loh-"mite"], though near Mount Sodom [SAH-dum] in Israel they can be caused by the dissolving of salt. These places are usually found in karst terrains, and the study of these places is speleology [spee-lee-AH-luh-jee]. Deposits growing from the floors of these places are called stalagmites, while deposits from the ceilings are stalactites. Name these chambers within the earth, such as the Mammoth one in Kentucky.
Answer: **cave**s [or **cavern**s or **grotto**s]

4.   In one novel by this writer, the protagonist requests to be buried in the corner of a churchyard by two lime trees. This author had that protagonist compare his love for a woman with his love of the Gaelic poet Ossian [AH-see-un]. That protagonist is in love with a woman who is engaged to Albert. In a play by this author, the main female character goes to prison after drowning her son. That play revolves around a deal about a man's wish to stay in a moment forever. This writer begins that play with a deal between God and Mephistopheles [meff-ih-STAH-fuh-leez]. Name this German author of *The Sorrows of Young Werther [VAIR-tuh]* and *Faust.*
Answer: Johann Wolfgang von **Goethe** [**GRR-tuh**]

5.   This instrument is the lead instrument in a piece based on *Song of Solomon* whose first section is called *Sicut Lilium inter spinas* [SEE-koot LEE-lee-oom IN-tur SPEE-nuss]. That work is Ralph [rayff] Vaughan Williams' *Flos Campi [KAM-pee].* There are several trios that combine this instrument with a flute and a harp, including Darius Milhaud's [meel-oh'z] *Adieu* and a sonata by Claude Debussy [deb-yoo-see]. In a standard orchestra, the people who play this instrument usually sit front and center or a little off to the right. The strings on this instrument are tuned exactly one octave higher than a cello. Name this instrument that is a little larger than a violin.
Answer: **viola**

6.   The person who held this position from January 1987 to June 1989 had a controversial meeting with Sandinista [san-din-EE-stuh] leader Daniel Ortega and eventually resigned over a controversy over bulk purchases of his book *Reflections of a Public Man*; that person was Jim Wright. The person who held this position from 1999 to 2006 was later jailed for using hush money to conceal sexual misconduct; that person was Dennis Hastert. The person with the longest uninterrupted time in this position was Tip O'Neill, and the longest overall time was Sam Rayburn. Name this position recently held by Paul Ryan and Nancy Pelosi.
Answer: **Speaker** of the (United States) House of Representatives [or House **Speaker**]

7. In one poem by this writer, the phrase "sweet deepener of dark loneliness" is used to describe the sounds made at twilight by a whippoorwill. During the 20th century, knowledge of this poet's travels increased with the finding of *Sora's Diary*. This person's best-known travel writing begins "Days and months are travelers of eternity. So are the years that pass by." Those words open this writer's travel diary *The Narrow Road to the Deep North.* Another poem by this writer ends "I long for Kyoto." Name this poet who wrote the lines "an ancient pond / a frog jumps in / the splash of water" and many other haikus.

Answer: **Matsuo** Basho [prompt on **Basho**]

8. These structures contain Volkmann's canals that allow blood flow from nutrient arteries. The ends of some of these structures are called epiphyses [eh-PIF-uh-seez]. Of the three classes of fish, the one that is not *Agnatha* or *Chondrichthyes* [kahn-DRIK-theez] has a name indicating that it has the tissue in these structures. These structures often include medullary [MED-ul-ar-ee] cavities that are lined by the endosteum [en-DAH-stee-um], while the outer surfaces of these structures are lined by the periosteum [peer-ee-AH-stee-um]. One tissue often found inside of these structures is where leukemia is active and where blood cells are created; that tissue is the marrow. Name these rigid structures that make up the skeleton.

Answer: **bone**s

9. An angel told this person "Recite in the name of thy lord who created, created man from a clot." This person rode a winged horse-like creature called a Buraq [boo-RAHK] to Jerusalem, where he met Abraham and Jesus, and he got into a debate with Moses about daily prayers. Later, though he was badly outnumbered, this leader won the Battle of the Trench. That battle was fought at Yathrib [YAY-thrib], which now has a different name. This person's practices are described in the sunna [SOON-uh], and his words are given in hadith [hah-DEETH]. Name this 6th- and 7th-century leader who was visited by the angel Gabriel and wrote down the Koran.

Answer: **Muhammad** [prompt on **The Prophet** or **The Messenger**]

10. After this leader captured the princess Drypetis [DRYP-tiss], he arranged for her to marry his bodyguard Hephaestion [huh-FEESS-tee-un]. This person came to power when his father was killed by the bodyguard Pausanias [paw-SAY-nee-us]. Shortly after gaining power, this leader forced the surrender of the army of Thessaly [THESS-uh-lee]. Because Pindar praised one of this person's ancestors, he spared Pindar's house when he destroyed Thebes [theebz]. This leader ended the Achaemenid [uh-KEE-muh-nid] Empire after defeating Darius III at Gaugamela [gau-guh-MEH-luh] and Issus. Name this person who succeeded his father, Philip II of Macedon, after being tutored by Aristotle.
Answer: **Alexander** the Great [or **Alexander III** of Macedon]

11. This novel praises the pictures in Thomas Beale's history book. One character in this novel says the word "Rarmai" while lying in his coffin and then decides to live. This novel's narrator asks himself about that character, "How then could I unite with this wild idolator in worshipping his piece of wood?". In the end, this novel's narrator stays afloat on top of an unused coffin after everyone else is killed. Daggoo, Tashtego, and Queequeg [KWEE-kweg] are the harpooners in this novel. This novel consists of Ishmael narrating Captain Ahab's pursuit of a whale. Name this novel by Herman Melville.
Answer: **_Moby-Dick_**(; or, The Whale) [do not accept or prompt on "The Whale"]

12. This psychologist's first major book examined the myth of wise people and the culture of avoidance among Yurok [YUR-ahk] Native Americans, and it also examined the effects of education on a Sioux [soo] reservation. That book was _Childhood and Society_, and this psychologist later wrote _Young Man Luther_. This person believed that the first 18 months of life were important to develop a sense of trust. This person described a problem that arises from inappropriate adolescent development using the phrase "identity crisis". Name this German-American scientist who included both "initiative vs. guilt" [pause] and "industry vs. inferiority" among his eight stages of psycho·social development.
Answer: Erik **Erikson** [accept **Homburger** or **Salomonsen**]

13. In the body, an equivalent of this molecule is condensed with carbon dioxide and ATP to form carbamoyl [kar-BAM-oh-ill] phosphate, ADP, and phosphate. Outside the body, sodium carbonate is created by the Solvay process, which begins with brine absorbing this compound. An alternative name for the Solvay process is based on the fact that it combines this compound with soda. The Ostwald process makes nitric acid from this compound. The Haber–Bosch [HAH-bur bahsh] process creates this compound from atmospheric nitrogen. Name this compound whose chemical formula is NH_3 ["N H 3"].

Answer: **ammonia**

14. About half of what is now this state was ceded to the United States in the *Treaty of Dancing Rabbit Creek* by Choctaw Native Americans. The first African-American person to enroll in this state's flagship university, who would later survive being shot during a march, was James Meredith. Reactions against integration in this state led to the murder of Medgar Evers, and reactions against voter registration led to the murders of James Chaney, Andrew Goodman, and Michael Schwerner near the small town of Philadelphia. Name this state where the Battle of Vicksburg was fought.

Answer: **Mississippi**

15. The partial type of this property exists for trace monoids. In logic, the material conditional is the only major binary relation that does *not* have this property. When this property does not hold, it is necessary to specify left or right multiplication. If this property holds, then changing the order of the operands does not change the result. NAND gates exhibit this property but are not associative. Many systems that have this property also have distributive and associative properties. Name this property stating that "x plus y" always equals "y plus x".

Answer: **commutative** property or **commutativity** [accept answers that also mention addition or multiplication]

16. This president's secretary of State wrote a letter to Austria saying "The house of Hapsburg are but as a patch on the earth's surface." Shortly after that, this president met with Lajos Kossuth [LAH-yosh KOH-shoot], the exiled leader of Hungary. This president's second secretary of State was Edward Everett, who replaced Daniel Webster. This person is the only president to both become president due to his predecessor's death and to fire his predecessor's entire cabinet. Just after this person became president, he supported and signed the Compromise of 1850. This person was the last president from the Whig Party. Name this person who became president when Zachary Taylor died.

Answer: Millard **Fillmore**

17. The transverse and longitudinal versions of this quantity are discussed in Albert Einstein's *On the Electrodynamics of Moving Bodies.* That paper divides by 1 minus speed squared divided by the speed of light squared to find the transverse form of this quantity after starting with the rest type of it. The period of a spring equals 2 pi times the square root of this quantity divided by the spring constant. The weight of an object equals this quantity times the gravitational field strength. Momentum is calculated by multiplying this quantity times velocity. Name this quantity that is measured in kilograms.

Answer: **mass**

18. This artist made two paintings with the same title, one now in Milan that shows Jesus pointing with his right hand and another now in London with an open right hand. Both of those paintings depict Jesus identifying himself to two disciples after his death. Another painting by this artist depicts Jesus pointing at a man in a customs house who is about to become a disciple. That painting in the Contarelli [kohn-tah-RELL-lee] Chapel is part of a series of paintings that this person made of that disciple. Name this Italian painter of *Supper at Emmaus [eh-MAY-uss]* and *The Calling of Saint Matthew.*

Answer: (Michelangelo **Merisi** da) **Caravaggio** [accept either underlined name; do not accept or prompt on "Michelangelo"]

19. The ground on which this sport is played is marked by tramlines. Jimmy Van Alen [AL-un] both started this sport's hall of fame and designed its tiebreaker system. One of the biggest rivalries in the history of this sport was between Chris Evert and Martina Navratilova. Some matches in this sport have been hyped as the "Battle of the Sexes", including two matches in 1973 featuring Bobby Riggs, who claimed he could beat any woman; he defeated Margaret Court but lost to Billie Jean King. More recent stars in this sport have included Roger Federer [FED-ur-ur] and Serena Williams. Name this sport in which a ball is hit over a net.

Answer: (lawn) **tennis**

20. This European country settled the city of Dili [DEE-lee] in the 16th century, and they fought for many years with the Dutch and the natives over the island of Timor [TEE-mor]. This country also fought with the Dutch over other islands in a conflict nicknamed the "Spice War". This country claimed Mozambique [moh-zam-BEEK] after expeditions by Pedro da Covilhã [koo-VEEL-yaw] and Vasco da Gama. Another explorer from this country was Pedro Cabral, who is considered the European discoverer of Brazil. Name this country that signed the Treaty of Tordesillas [tor-day-SEE-yahss] with Spain and which now shares the Iberian Peninsula with Spain.

Answer: (Kingdom of) **Portugal** [or Reino de **Portugal**]

21. All irrational numbers map to this number in the Thomae [TOH-may] function. If all of the equations in a system equal this number, then the system is classified as homogeneous. If the determinant of a matrix equals this number, then the matrix cannot be inverted. If factors multiply to equal this number, then at least one of the factors equals this number, according to this number's product property. This number is the only real number without a multiplicative inverse, which means that this number does not have a reciprocal. Identify this number that is the additive identity and that is neither positive nor negative.

Answer: **zero**

1. At the beginning of this book, the author writes about forgetting her lines during an Easter church service.

A. Name this 1969 autobiography set mostly in Stamps, Arkansas.

Answer: ___*I Know Why the Caged Bird Sings*___

B. This poet wrote *I Know Why the Caged Bird Sings.* She read "On the Pulse of Morning" at Bill Clinton's inauguration.

Answer: Maya **Angelou** [or Marguerite Ann **Johnson**]

C. The title *I Know Why the Caged Bird Sings* is taken from a line in this poet's *Sympathy.* This poet also wrote the poem "Dawn" in his collection *Lyrics of Lowly Life.*

Answer: Paul Laurence **Dunbar**

2. These segments meet at the centroid of a triangle.

A. Name these segments from the vertex of a triangle to the midpoint of the opposite side.

Answer: **median**s

B. This special case of Stewart's theorem relates the length of a median to the lengths of the triangle's sides.

Answer: **Apollonius**'s theorem

C. If a median is 36 units long, find the distance from the vertex at the median's endpoint to the centroid of the triangle.

Answer: **24** units

3. Much of this short story is about the relationship between Dr. Ragin [RAY-gin] and Ivan Dmitritch Gromov [GROH-mawff].

A. Name this story in which Ragin eventually becomes a psychiatric patient like Gromov.

Answer: "**Ward Number 6**" [or "**Palata nomer shest**"]

B. This Russian author wrote "Ward Number Six" as well as plays such as *Three Sisters* and *The Cherry Orchard.*

Answer: Anton (Pavlovich) **Chekhov** [AN-tahn **"CHECK-off"**]

C. In this Chekhov play, Nina compares herself to the title bird that has been killed by Konstantin [KAHN-stun-teen].

Answer: *The **Seagull*** [or ***Chayka***]

4. This phase transition is the opposite of melting.

A. Name this transition from a liquid state to a solid state.

Answer: **freezing** [accept **freeze**]

B. Because substances have a latent heat of this process, which is also known as an enthalpy of this process, freezing requires the removal of a significant amount of heat.

Answer: **fusion**

C. This phrase describes a very fast freezing process using very low temperatures, often to freeze food without forming ice crystals.

Answer: **flash** freezing [prompt on **quick** freezing]

5. This country was headed by Carlos Andrés Pérez from 1974 to 1979 and from 1989 to 1993.

A. Name this South American country with large oil reserves whose capital is Caracas [kuh-RAH-kus].

Answer: (Bolivarian Republic of) **Venezuela** [or (República Bolivariana de) **Venezuela**]

B. A few years after Pérez was removed for embezzlement, this leader was elected in 1998, and he ruled until he died in 2013. He centralized power and tried to redistribute wealth.

Answer: Hugo **Chávez** (Frías) [ooh-goh **CHAH-vez**]

C. While Chávez ran Venezuela, many South American countries moved leftward, including this one that elected its first indigenous president, Evo [AY-voh] Morales.

Answer: (Plurinational State of) **Bolivia** [or (Estado Plurinacional de) **Bolivia**]

6. This property is often represented by putting the name of a set between vertical bars.

A. Name this property that represents the size of a set. For finite sets, it is just the number of elements in the set.

Answer: **cardinality** [prompt on **cardinal** numbers]

B. This German mathematician used the diagonal argument to prove that the cardinality of the set of real numbers is larger than the cardinality of the set of natural numbers.

Answer: Georg **Cantor** [GAY-ork **KAHN-tor**]

C. Find the largest possible cardinality of A intersection B [pause] if the cardinality of A is 5 and the cardinality of B is 7.

Answer: **5**

7. The individual names of these creatures vary from source to source, but a few sources use the names "Parthenope" [par-THEN-oh-pee] and "Leucosia" [loo-KOH-shuh].

A. Name these creatures that lured sailors with beautiful songs. Odysseus [oh-DISS-ee-uss] was tied to his mast so that he could listen to them.

Answer: **Siren**s [do not accept "mermaid(s)"]

B. The Argonauts [AR-goh-nawts] were able to get past the Sirens by having this musician play music that was louder and more beautiful than theirs.

Answer: **Orpheus** [**OR-fee-uss**]

C. The Argonauts took Orpheus on their travels based on the advice given by this creature, who played a major role in raising and teaching Jason.

Answer: **Chiron** [**KY-rahn**] [prompt on **centaur**]

8. This poet's sonnets usually had an octave with the rhyme scheme "A B B A A B B A", followed by a sestet with the rhyme scheme "C D E C D E".

A. Name this 14th-century Italian poet.

Answer: **Petrarch** [or Francesco **Petrarca**]

B. Many of Petrarch's poems were written to this woman, whom he did not know well.

Answer: **Laura**

C. Petrarch wrote this epic poem about the Second Punic War.

Answer: ***Africa***

9. The Nobel Prize in Physics in 2014 was given for the invention of the blue light-emitting type of this device.

A. Name these devices that conduct electric current primarily in one direction.

Answer: **diode**s

B. The diode law is sometimes named for William Shockley, who along with John Bardeen and Walter Brattain [BRAT-un] invented this three-terminal semiconductor device.

Answer: (point-contact) **transistor**s

C. Many early diodes were these devices that take advantage of the Edison effect. Early computers like ENIAC [EE-nee-ak] used thousands of these devices.

Answer: **vacuum tube**s [prompt on electron **tube**s or **valve**s]

10. Name these artists who set paintings in Paris:

A. This pointillist painted *A Sunday Afternoon on the Island of La Grande Jatte.*

Answer: Georges (Pierre) **Seurat** [zhorzh **soo-rah**]

B. This artist painted a green lamp post in the middle of his *Paris Street; Rainy Day.*

Answer: Gustave **Caillebotte** [**ky-boht**]

C. This artist, who painted part of the ceiling of the Paris Opéra, also made the painting *Paris Through the Window.*

Answer: Marc **Chagall** [or Moishe **Shagal**]

11. This place was attacked on December 7, 1941.

A. Name this place on the island of Oahu in Hawaii, where four U.S. ships were sunk and four others were damaged.

Answer: **Pearl Harbor**

B. Complete the quote: President Franklin Roosevelt addressed Congress the next day with a speech that began "Yesterday, December 7, 1941 a date which will live in…"

Answer: a date which will live in **infamy**

C. Name both of the ships that were sunk at Pearl Harbor and never completely raised. The *Oklahoma* was raised but never rebuilt.

Answer: USS ***Arizona*** and USS ***Utah*** [either order]

12. The traveller in this poem states "Two vast and trunkless legs of stone stand in the desert."

A. Name this poem by Percy Bysshe [bish] Shelley that says "Look on my Works, ye Mighty, and despair!".

Answer: "**Ozymandias**"

B. "Ozymandias" is this type of 14-line poem.

Answer: **sonnet** [do not accept more specific answers]

C. Percy Shelley also wrote this lyrical drama in which the protagonist gets to live in a cave with his wife Asia.

Answer: ***Prometheus Unbound***

13. If two events have this type of relationship, then the probability of them both happening equals the product of the probabilities of each one happening separately.
A. Give this adjective that describes events if one of them occurring does not affect the probability of the other occurring.
Answer: **independent** events or event **independence** [do not prompt on "dependent"]
B. Give the two-word phrase that describes events that are disjoint, meaning that if one of them happens then the other cannot.
Answer: **mutually exclusive** events [or **mutual exclusivity**]
C. If events A and B are mutually exclusive and it is also impossible for neither of them to occur, find the probability of B if the probability of A is 0.28.
Answer: 0**.72** [or **18/25**]

14. The protagonist of this novel becomes a legendary enemy of a group of Native Americans called Yeehats.
A. Name this novel that begins "Buck did not read the newspapers."
Answer: *The **Call of the Wild***
B. Buck's original owner in the Santa Clara Valley is Miller, who has this job.
Answer: **judge**
C. This author wrote *The Call of the Wild* and the short story "To Build a Fire".
Answer: Jack **London** [or John Griffith **London** or John Griffith **Chaney**]

15. The curve named for this procedure is very steep at the equivalence point.
A. Name this procedure that finds the concentration of one solution by slowly combining it with another solution of known concentration.
Answer: **titration** [**"tie-TRAY-shun"**] [or **titrating** or **titrimetry**; accept **volumetric analysis**]
B. This mixture of dyes turns red for acids and blue for bases [pause] and is often used as an indicator in titrations.
Answer: **litmus** [or **azolitmin**]
C. Instead of an indicator, some titrations measure this electrical potential difference between the surface of a solid particle in a liquid and the bulk of the liquid.
Answer: **zeta** potential

16. In this country's September 2021 elections, the Social Democratic Party had its best showing in a long time, which is why this country is now headed by Olaf Scholz.

A. Name this country that held elections to determine a successor for Angela [AHNG-eh-luh] Merkel.

Answer: (Federal Republic of) **Germany** [or Bundesrepublik **Deutschland**]

B. Voters in the election chose members of this German parliament. It meets in the Reichstag [RYK-shtahg] building.

Answer: **Bundestag** [**BOON-duh-shtahg**]

C. Many of the flights carrying people out of Afghanistan at the end of the war in August 2021 went to this German air base.

Answer: **Ramstein** [**RAHM-shtyn**]

17. This person was the president during the September 11 terrorist attacks.

A. Name this president whose father was also president.

Answer: George (Walker) **Bush** [accept **Bush** 43; accept the younger **Bush** or similar answers that specify his relative or absolute position]

B. Bush was criticized for his reaction to this hurricane that struck New Orleans in 2005.

Answer: Hurricane **Katrina**

C. Near the end of Bush's presidency, the Great Recession started after this financial services firm filed for bankruptcy. It was the largest bankruptcy filing in U.S. history.

Answer: **Lehman Brothers** (Holdings Inc.) [prompt on **Lehman**]

18. The Moon has a near side and far side, the latter of which is sometimes called the dark side.

A. The moon is described as waxing when it is in a phase where its visibility is increasing. What term is used when its visibility is decreasing?

Answer: **waning** [accept **wane**]

B. Several dark regions on the Moon are called *mare* [MAR-ay], which is translated from Latin into English as this word.

Answer: **sea**s

C. Scientists have given this name to the planet that is believed to have created the Moon by colliding with Earth over four billion years ago.

Answer: **Theia** [**THEE-uh**]

19. When this musical was turned into a movie, Frankie Valli recorded a song saying that the song's title "is the time, is the place, is the motion" and "is the way we are feeling".
A. Name this musical about the class of 1959 at Rydell High School, which includes the T-Birds and the Pink Ladies.
Answer: _**Grease**_
B. In *Grease*, this is the name of Kenickie's [kuh-NIK-ee'z] car and the title of the song he sings when he fixes it up.
Answer: "**Greased Lightnin'**" [accept **Greased Lightning**]
C. This character is the head of the Pink Ladies. At one point in the musical she thinks she is pregnant, though that scene is left out of some productions.
Answer: (**Betty**) **Rizzo** [accept either underlined part]

20. These molecules are used during translation.
A. Name these molecules that are usually classified as messenger, transfer, or ribosomal.
Answer: **RNA** [or **ribonucleic acid**]
B. This nucleobase [NOOK-lee-oh-"base"] is used in RNA but not DNA, since DNA uses thymine ["THIGH"-meen] instead of this base.
Answer: **uracil** [**YUR-uh-sill**] [prompt on **U**]
C. The DNA types of these enzymes separate DNA strands, while the RNA types identify viruses and also bind or remodel RNA.
Answer: **helicase**s [**HEE-lih-"case**s"]