

## 2018 Reinstein Set – Packet 3

### Tossups

1. This quantity is not mass, but Einstein related it to energy in his thought experiment about a box. This quantity can be paired with energy in Heisenberg’s uncertainty principle even though it doesn’t have an operator. In special relativity theory, this quantity is multiplied by the Lorentz factor, which represents the dilation of this quantity. Velocity is the derivative of position with respect to this quantity, so average velocity is the change in position divided by the change in this quantity. Name this quantity that, in Minkowski space, comprises the fourth dimension.

Answer: **time**

2. One poem in this form seems to contradict itself with the line “Better by far you should forget and smile.” That poem is “Remember” by Christina Rossetti. Another poem in this form ends “They also serve who only stand and wait”, and it begins “When I consider how my light is spent”. That poem is “On His Blindness” by John Milton. A poem of this type by William Shakespeare asks “Shall I compare thee to a summer’s day?” Name this type of poem of which Shakespeare wrote 154, each of which has 14 lines.

Answer: (Shakespearean) **sonnets**

3. An **anomaloscope** [uh-NAHM-uh-loh-“scope”] tests for this condition by asking patients to match a rectangle they control to a fixed rectangle. Variants of this condition known as **protanopia** [PROH-tuh-NOH-pee-uh] and **deutanopia** [DOO-tuh-ruh-NOH-pee-uh] are sex-linked and more common in males. A form of this condition caused by one type of cone being missing is called Daltonism. This condition can be detected using an **Ishihara** [ish-ee-HAHR-uh] test, which uses plates with dots that form numbers. Name this condition that may lead to total **monochromatism** [mah-no-KROE-muh-tiz-im] or an inability to distinguish several shades of red and green.

Answer: **colorblindness** or being **color-blind** [do not accept or prompt on “blind(ness)”]

4. Cantor’s theorem about this operation states that the result is nonempty when this operation is applied to non-empty nested compact subsets. If  $A$  and  $B$  are sets, then the set “ $A$  minus  $B$ ” is calculated by removing from  $A$  any element in the result of this operation on  $A$  and  $B$ . On a Venn diagram, this operation is represented by the overlapping section. De Morgan’s laws relate complement, union, and this operation. Name this operation on sets whose result is the elements in *both* input sets.

Answer: **intersection** [prompt on **and** or **conjunction**]

5. In one play set in this country, a fisherman finds a ring that helps a king recognize the pregnant mother of his child. Another author from this country wrote a play about a woman organizing forces against a king in the gold mining town Yaksha. A poet from this country wrote a work concluding with the repetition of “jaya he” [jah-yah heh] and also wrote a poem beginning “Thou hast made me endless, such is thy pleasure” to open a collection whose title is translated as *Song Offerings*. Name this home country of **Kalidasa** [kah-lee-DAH-sah] and **Rabindranath Tagore** [ruh-BIN-druh-naht tag-OR], who wrote in his native Bengali language.

Answer: **India** [accept Republic of **India** or **Bharat**(iya) Ganarajya]

6. One faction of this party was started by German-born U.S. Senator Carl Schurz in opposition to a President from this party. This political party had another faction that brought races together that was nicknamed the Black-and-Tan faction. White southerners who supported this party and Reconstruction were called Scalawags. This party’s first presidential candidate was John C. Frémont, who lost the Election of 1856, and its first victory was four years later. Name this party of Ulysses S. Grant and Abraham Lincoln.

Answer: **Republican** Party [accept **GOP** or **Grand Old** Party]

7. This god destroyed Salmonia after King Salmoneus built a bridge and a chariot that dragged bronze kettles so he could imitate this god. According to Ovid, when this god was an infant he created the cornucopia by tearing the horn off of a goat. That event occurred on Mount Ida, where this god was fed by **Amalthea** [uh-MAL-thee-uh] while being hidden from his father, Cronus. This god then saved his siblings, whom Cronus had swallowed. Name this husband of Hera who controlled lightning and thunder and who was the chief god on Olympus.

Answer: **Zeus** or **Jupiter**

8. This person replaced Daniel Patrick Moynihan in the U.S. Senate by defeating Rick **Lazio** [LAH-zee-oh]. Before that, when this person’s Task Force on National Health Care Reform was unsuccessful, this person worked with Congress to pass the State Children’s Health Insurance Program. This person pushed for a NATO-led military intervention in Libya while serving as Secretary of State. Name this former First Lady of Arkansas and the U.S., who lost the Democratic presidential nomination to Barack Obama in 2008 and also lost the 2016 general election.

Answer: Hillary **Rodham Clinton** [accept either underlined name]

9. Chemical hardness is proportional to the derivative of this property with respect to the number of electrons. One method of calculating this property makes it the opposite of chemical potential. In another definition of this property, it nearly varies directly with effective nuclear charge and inversely with the square of **covalent [koh-VAY-lint]** radius. The central atom in a Lewis dot structure is almost always the one with the smallest value for this property. Atoms with large differences in this quantity are able to form ionic bonds. Name this measure of an atom's ability to attract electrons.

Answer: **electronegativity**

10. The ending chord of a choral symphony by this composer has a C octave with a high E, and begins with two E-minor triads outside a G octave. That piece is this composer's *Symphony of Psalms*. In a ballet by this composer, Prince Ivan is given a feather by **Koschei [kah-SHAY]** the Immortal. Another of this composer's ballets ends with the "Chosen One" doing a "Sacrificial Dance" and nearly caused a riot at its 1913 premiere. Name this composer whose works for Sergei **Diaghilev [dee-AH-gee-lef]** include *The Firebird*, *Petrushka [puh-TROOSH-kuh]*, and *Rite of Spring*.

Answer: Igor **Stravinsky**

11. One character in this novel is offended when he is given a lady's handkerchief that he had been standing on. The central character of this novel pursues a "man from Meung" who turns out to be the **Comte de Rochefort [kawmt duh rohsh-for]**. After noticing a **fleur-de-lis [floor duh lee]** branded on her shoulder, that central character escapes from **Milady [mih-lay-dee]** de Winter, and he avoids a sequence of three duels when he and his combatants are attacked by the guards of Cardinal **Richelieu [reesh-el-yoo]**. Name this Alexander **Dumas [doo-mah]** novel in which **d'Artagnan [dar-tan-yahn]** joins the swordsmen Athos, Porthos, and Aramis, who repeat "All for one and one for all".

Answer: *The **Three Musketeers*** [or *Les **Trois Mousquetaires***]

12. Due to a critical pamphlet, this leader had **Johann [YOH-hahn]** Philipp Palm arrested and executed. After a costly victory at the Battle of **Eylau [AY-lao]**, this leader pushed forward and was able to sign the favorable Treaties of Tilsit after defeating the Russians at the Battle of **Friedland [FREED-land]**. Earlier, this leader used the hollow square formation to win the Battle of the Pyramids, and he had Marshal **Michel Ney [mee-shel neh]** use the same formation at the Battle of **Jena [YEH-nah]**. Though he was usually victorious, this leader lost at the Battle of Leipzig to the Sixth Coalition. Name this French Emperor who also lost at Waterloo.

Answer: **Napoleon** (I) **Bonaparte** [accept either underlined name]

13. This author created a character who is sometimes mistakenly called Spink-Bottle and is obsessed with newts. That character, Gussie Fink-Nottle, is engaged to marry Madeline Bassett, whose father Watkyn owns **Totleigh** [“TOT”-lee] Towers. Gussie exchanges identities with one of this author’s characters in *The Mating Season*. Several of those characters try to obtain an antique cow creamer in this author’s *The Code of the Woosters*, which is about Bertie Wooster and his **valet** [VAL-it]. Name this English author who also wrote *Right Ho, Jeeves*.

Answer: P(elham) G(renville) **Wodehouse**

14. This organ shrinks or becomes flat in empty sella syndrome. Though many animals have an intermediate lobe in this organ, humans do not. A tumor in this organ can cause **acromegaly** [ak-roh-MEG-uh-lee], which can involve growth of the hands and feet during adulthood. This organ is protected by the sella **turcica** [TUR-ki-kuh] of the **sphenoid** [s’FEE-noyd] bone. The anterior part of this gland produces **prolactin** [pro-LAK-tin] in nursing mothers, and it also releases **luteinizing** [“LOO-tin-eye-zing”] hormone and follicle-stimulating hormone. Name this gland connected to the **hypothalamus** [“hi”-poh-THAL-uh-muss] under the brain.

Answer: **pituitary** gland [or **hypophysis**]

15. This thinker proposed that men were “prosthetic Gods” and that children had an “oceanic feeling” in one of his books. Another of this writer’s books developed Sabina **Spielrein’s** [SPEEL-“rain’s”] concept of **thanatos** [THAN-uh-tohss] as the death drive, contrasting with **eros** [“AIR”-ohss], or sexual drive. One case study published by this thinker told of Little Hans, who was afraid of horses, which this thinker connected to his theory of the **Oedipus** [ED-uh-pus] id, ego, and superego. Name this originator of psychoanalysis.

Answer: Sigmund **Freud** [or Sigismund Schlomo **Freud**]

16. This actress portrayed Rose Halshford in a movie in which she finds clues about the disappeared drug addict Rachel Winacott. This actress also voices Margo, the oldest of three orphans raised by Gru, in the *Despicable Me* films. This actress appeared in *The Intruders*, and played the student who managed the band in the film *School of Rock*. After playing the little sister on the Nickelodeon show *Drake & Josh*, this actress starred in a show about two teenagers who broadcast a web show. Name this actress who starred with Jennette McCurdy on *iCarly*.

Answer: Miranda **Cosgrove**

17. This story's narrator has a vision of seven white candles sinking and his judges vanishing before passing out. The narrator of this story measures his room in the darkness by traveling the walls until he reaches a rag he pulled from his robe, and he is ultimately saved by General Lasalle's outstretched arm when Toledo ["toe-LAY-dough"] was liberated from the Inquisition. This story's narrator rubs meat on his bandages so that rats will gnaw through them, allowing him to escape just as his robe was being sliced. Name this story in which the narrator avoids the two title modes of death, written by Edgar Allan Poe.

Answer: "The **Pit and the Pendulum**"

18. This person pledged to build 300,000 houses per year and made Harold Macmillan his Minister of Housing. After being slowed down by a stroke, this person resigned his leadership, making way for Anthony Eden. This leader of the Conservative Party had a rivalry with Labour Party leader Clement Attlee, and he first came to power after Neville Chamberlain resigned in 1940. Name this British Prime Minister who worked closely with Franklin Roosevelt and Joseph Stalin during World War II.

Answer: Winston (Leonard Spencer) **Churchill**

19. A famous loggia [LOH-jah] designed by this architect has nine bays opening towards the Piazza Santissima Annunziata [pee-AHT-sah sahn-TEE-see-mah ah-noon-zee-AH-tah] and is part of his Hospital of the Innocents. This architect designed a building now decorated by Pontormo works, the Capponi [kah-POH-nee] Chapel. This architect used internal chains and an eight-corner design to plan the largest brick dome ever built, which is on top of the Cathedral of Santa Maria del Fiore [sahn-tah mah-REE-ah del fee-OH-ray]. Name this Florentine architect who was often in competition for projects with Lorenzo Ghiberti [gih-BAIR-tee].

Answer: Filippo **Brunelleschi** [fee-LEE-poh broo-neh-LESS-kee]

20. This phenomenon is used in junctions in magnetic random access memory cells and multi-junction solar cells. The ability of superconducting Cooper pairs to take part in this phenomenon was predicted by Brian Josephson. During the 1980s, Gerd Binnig [gairt binnik] and Heinrich Rohrer developed a microscope based on this phenomenon. George Gamow [GAM-awf] explained alpha particles escaping from a nucleus using this phenomenon. Name this quantum effect in which a particle passes through a barrier despite not having enough energy to do so.

Answer: quantum **tunnelling**

21. In a **chi [ky]**-squared distribution, this value equals the number of degrees of freedom. Bessel's correction should only be used when there is uncertainty in this value for a population. Bessel's correction can be used to find the standard deviation, which can also be called the standard error of this value. The geometric version of this quantity equals a root of the product of the numbers in the set. In a normal distribution, this quantity is also the median and mode. Name this value whose **arithmetic [“air”-ith-MET-ik]** type is commonly called the average.

Answer: (arithmetic) **mean** or **expected value** [prompt on **average** before the end]

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### Bonuses

1. Jhumpa Lahiri's [JOOM-pah lah-"HERE"-ee'z] collection *Unaccustomed Earth* took its title from this novel's introduction, *The Custom-House*.

A. Name this novel, set in 17th-century Massachusetts, whose narrator tells of Hester Prynne [prin] being publicly shamed for adultery.

Answer: *The **Scarlet Letter***

B. This author wrote *The Scarlet Letter*.

Answer: Nathaniel **Hawthorne**

C. This character in *The Scarlet Letter* first appeared denouncing the fact that Hester was displayed on a scaffold but her partner was not punished. This physician was later revealed to be Hester's long-lost husband.

Answer: **Roger Chillingworth** [accept either]

2. These organisms are classified as **Monera** [moh-"NEAR"-uh] in the five-kingdom system, and have their own domain in the three-domain system.

A. Name these organisms that are often shaped like rods, spheres, or spirals.

Answer: (eu)**bacteria** [accept **bacterium**]

B. The root systems of many **legumes** [LEG-yoomz] contain *Rhizobia* ["rye"-ZOH-bee-uh] bacteria, which help the legumes by combining this atmospheric gas with hydrogen.

Answer: **nitrogen** [or **N<sub>2</sub>**]

C. While some bacteria are obligate **aerobes** ["AIR"-ohbz] or obligate **anaerobes** ["AN-uh-rob'es"], others fit into this classification because they use aerobic respiration if oxygen is present and anaerobic respiration if oxygen is not present.

Answer: **facultative** [FAK-uh-tay-tiv] anaerobes or **facultative** aerobes

3. A crisis in this country led to the creation of the show *America Held Hostage*, which later became *Nightline*.

A. Name this country in which the U.S. embassy was taken over in 1979. Hostages from there were held for over a year.

Answer: (Islamic Republic of) **Iran**

B. The hostage crisis made this U.S. president look weak, contributing to his loss to Ronald Reagan in the 1980 election.

Answer: (James Earl) "Jimmy" **Carter** (Jr.)

C. This U.S. National Security Advisor pushed for a military solution to the conflict, but the attempted one failed when some helicopters crashed.

Answer: **Zbigniew Brzezinski** [z'-BIN-yef bur-ZIN-skee]

4. One poem claims that “something there is that doesn’t love” one of these things.

A. Name this type of object that is repaired in the spring by two neighbors, one of whom claims that “Good fences make good neighbors”, in a poem titled for “Mending” one of these things.

Answer: **walls**

B. This American poet published “Mending Wall” in his collection *North of Boston*. His other collection *Mountain Interval* contains “The Road Not Taken”.

Answer: Robert (Lee) **Frost**

C. In this other poem from *Mountain Interval*, a boy dies after a buzz-saw accident when his sister calls him to supper.

Answer: **“Out, Out—”**

5. In modular arithmetic, only this kind of quantity is considered.

A. Name this type of quantity that is “left over” from the **quotient [KWOH-shint]** when dividing.

Answer: **remainder**

B. The remainder ends up in the lower right corner in this method for dividing polynomials more quickly than long division. No variables are written while performing polynomial division this way.

Answer: **synthetic** division

C. Find the remainder when  $x$  to the fourth, plus  $2x$  cubed, plus  $5x$  squared, plus 3 [pause] is divided by  $x$  minus 1.

Answer: **11**

6. This novel’s main character becomes a mayor while he is using the name “Monsieur Madeleine”.

A. Name this novel about a character who spent 19 years in jail for stealing bread: **Jean Valjean [zhahn val-zhahn]**.

Answer: **Les Misérables [lay mee-zair-ahbl’]** [or *The Miserable Ones* or *The Wretched Poor*; do not accept or prompt on “Les Miz”]

B. This police officer pursues Valjean for much of the novel. This character also arrested **Fantine [fan-teen]**.

Answer: Inspector **Javert [zhah-vair]**

C. This daughter of Fantine works for the **Thênardiers [tay-nard-yayz]** until Valjean liberates her. She ultimately marries **Marius Pontmercy [mah-ree-uss pawn-mair-see]**.

Answer: **Cosette [koh-set]**

7. David Ricardo stated that commodities gain value from this concept and from labor.

A. Name this basic economic condition that arises because the desire for resources is seemingly limitless, while the amount of resources available is limited.

Answer: **scarcity** [or **paucity**]

B. Some critics have said that this writer's *Grundrisse* [GROON-dree-seh] described a post-scarcity society. This writer later contradicted some of those ideas in *Das Kapital* [dahss kah-pee-TAHL].

Answer: Karl **Marx**

C. In capitalism, scarcity is controlled by setting prices on commodities. What term means the price at which the demand for a commodity drops to zero?

Answer: **choke** price

8. This person wrote the first draft of the document that became known as the Southern Manifesto.

A. Name this longtime U.S. senator who won four states in the presidential election of 1948, in which he ran on the ticket of the States' Rights Democratic Party.

Answer: (James) Strom **Thurmond**

B. The Southern Manifesto was written in reaction to this 1954 Supreme Court decision.

Answer: **Brown v. Board of Education of Topeka** [accept either part]

C. Throughout most of the 1980s, 1990s, and early 21st century, the president pro tem of the Senate was either Thurmond or this West Virginia Democrat who much earlier had been a local Ku Klux Klan leader.

Answer: Robert **Byrd**

9. These violin **concerti** ["con-CHAIR-tee"] were written during the 1720s and were published with accompanying poems.

A. Give the collective names for these works that were part of "The Contest Between Harmony and Invention".

Answer: *The Four Seasons* [or *Le quattro stagioni*]

B. This composer, nicknamed "The Red Priest", wrote *The Four Seasons*.

Answer: Antonio (Lucio) **Vivaldi**

C. Vivaldi wrote this opera based on Ludovico Ariosto's [loo-doh-VEE-koh ah-ree-OH-stoh'z] epic poem in which Angelica claims that **Medoro** [meh-DOR-oh] is her brother.

Answer: **Orlando furioso**

10. This prefix is used because the functions it describes give lengths along a curve.

A. Give this prefix used for the inverses of trigonometric functions.

Answer: **arc-**

B. Find the principal value of the arctangent of 1, in radians.

Answer:  **$\pi/4$  or  $1/4 \pi$**  [accept  **$0.25 \pi$** ]

C. If  $x$  is any number between 0 and 1, find the sum—in radians—of the arcsine of  $x$  and the arccosine of  $x$ . Your answer should be a number not involving  $x$ .

Answer:  **$\pi/2$  or  $1/2 \pi$**  [accept  **$0.5 \pi$** ]

11. Name these mythological beings who do bad things:

A. This devil from Abrahamic religions is sometimes considered a fallen angel. The Lord challenges Job after a conversation with this creature.

Answer: **Satan** [may be pronounced sah-TAHN]

B. In some Jewish myths, this woman was created before Eve. She left Adam and now steals babies.

Answer: **Lilith**

C. This enemy of Ra and Ma'at was a giant serpent. His opposition to Ra made him the god of darkness, and his opposition to Ma'at made him the god of chaos.

Answer: **Apep** [or **Apophis**]

12. This is the SI unit for the amount of a substance.

A. Name this unit. Calculations with it often involve Avogadro's [ah-voh-GAHD-roh'z] constant.

Answer: **mole**

B. The formal definition of a mole is based on this most-abundant isotope of carbon.

Answer: carbon-**12**

C. The charge of one mole of electrons—a little under 100,000 coulombs—is a constant named for this scientist.

Answer: Michael **Faraday** [accept **Faraday's** constant]

13. In 1951, a Seventeen-Point Agreement gave China sovereignty over this region.

A. Name this region whose spiritual leader is the Dalai Lama.

Answer: **Tibet** (Autonomous Region)

B. During the past decade, several Tibetan monks have taken this action to protest China. This form of protest was also used by Mohamed **Bouazizi** [boo-ah-ZEE-zee] in 2011 in Tunisia and **Thich Quang Duc** [thich kwang duk] in 1963 in Vietnam.

Answer: self-**immolation** [accept any descriptive answer indicating setting **themselves** on **fire** or **burning themselves**; prompt on **suicide**]

C. Tibet temporarily became independent following the collapse of this Chinese dynasty in 1912.

Answer: **Manchu** dynasty or (Great) **Qing** dynasty

14. These objects are called “short-period” if they orbit in less than 200 years, or “long-period” if they take more.

A. Name this type of object in space. Edmond Halley made calculations related to one of them.

Answer: **comets**

B. Scientists believe that long-period comets originate in this region named for a Dutch scientist.

Answer: (Öpik-) **Oort Cloud**

C. This NASA spacecraft blasted a crater on the comet Tempel 1 in 2005 to study its **ejecta** [ee-JEK-tuh].

Answer: **Deep Impact**

15. The length of one of these segments is the height of a triangle.

A. Name this type of segment that connects a vertex in a triangle to the opposite side, and is perpendicular to that side.

Answer: **altitude**

B. The altitudes of a triangle meet at this point.

Answer: **orthocenter**

C. If the area of a triangle is 10 square units, find the length of the altitude to a side that is 5 units long.

Answer: **4** units

16. This large 1877 painting is set in the **Place [plahss]** de Dublin.

A. Name this painting in which many people are holding umbrellas. The center of this painting has a green lamp post.

Answer: **Paris Street; Rainy Day** [or *Rue de Paris, temps de pluie*]

B. This French artist painted *Paris Street; Rainy Day* as well as *The Floor Scrapers*.

Answer: **Gustave Caillebotte** [goo-stahv ky-bawt]

C. Gustave Caillebotte was considered a member of this artistic movement and often supported its artists financially, including paying studio rent for Claude Monet.

Answer: **Impressionists** or **Impressionism**

17. This chaotic type of flow occurs when the Reynolds number is large.

A. Name this type of liquid flow. When this kind of flow occurs in air currents, it can cause problems for airplanes.

Answer: **turbulent** flow or **turbulence**

B. Turbulent flow is contrasted with this flow characterized by orderly layers.

Answer: **laminar** flow

C. One of the characteristics of turbulent flow is the existence of these rotating regions.

Answer: **vortices** or **vortexes**

18. This explorer started Santa María de la Antigua, the first permanent city started by a European in the Americas.

A. Name this Spanish explorer who stood on a peak in **Darién [dar-ee-EN]** to become the first European to see the American coast of the Pacific Ocean.

Answer: **Vasco Núñez de Balboa** [vahss-koh NOON-yez day bahl-BOH-ah]

B. Balboa was beheaded after being accused of trying to gain power from this man, his father-in-law.

Answer: Pedro **Arias** Dávila or **Pedrarias** [prompt on **Dávila**]

C. Pedro Arias Dávila started the city that is now the capital of this country. **Arnulfo Arias [ar-NOOL-foh AR-ee-ahss]** led this country three times in the 20th century, and his widow led it at the beginning of the 21st century.

Answer: (Republic of) **Panama** [or (República de) **Panamá**]

**19.** Catalysts have no impact on applications of this principle.

A. Name this principle stating that certain changes to systems at equilibrium lead to the establishment of a new equilibrium.

Answer: **Le Châtelier's** [luh shaht-lee-ay'z] principle

B. One example of Le Châtelier's principle is this effect, which is invoked when a molecule is added to a solution that is in part the same as another molecule in the solution.

Answer: **common ion** effect

C. In the context of Le Châtelier's principle, this term refers to a reagent whose concentration is changed. In other contexts, this term refers to the substance on which an enzyme acts.

Answer: **substrate**

**20.** Much of this novel is told through the journals of Jonathan Harker and Mina Murray.

A. Name this novel in which Lucy Westenra becomes the victim of a Transylvanian count.

Answer: ***Dracula***

B. This author wrote the 1897 novel *Dracula*.

Answer: (Abraham) "Bram" **Stoker**

C. In *Dracula*, John Seward calls in this Dutch doctor to figure out what is wrong with Lucy.

Answer: **Abraham Van Helsing** [accept either underlined portion]

**21.** Answer the following about the Paraná River:

A. It starts in this Brazilian state. This state shares its name with Brazil's most populous city, which has almost 9 million more inhabitants than Rio de Janeiro.

Answer: **São Paulo**

B. Brazil and Paraguay share this dam on the Paraná River that produces the most hydroelectric power in the world.

Answer: **Itaipu** [ee-"tie"-POO] Dam

C. The Paraná River flows into the Paraguay River, which in turn meets the Uruguay to form this river. Buenos Aires, Argentina and Montevideo, Uruguay are on opposite shores of this river.

Answer: Rio de la **Plata** [or La **Plata** River or River **Plate**]