2022 ACF Winter

Packet 3 by Cornell A, CWRU A, Harvard A, Iowa A

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Tossups

1. In one device, this process’s rate is proportional to the central charge density according to the Tersoff–Hamann formula. Work at Sony in the 1950s demonstrated that this process caused a device made of germanium to exhibit decreased current when voltage increases. This process causes the negative differential resistance of the Esaki diode. Binnig and Rohrer invented a device in which this process is detected by a small conducting tip that “scans” the sample. George Gamow outlined how this process is necessary for alpha decay. A type of sub-nanometer resolution microscope is named for this process, which gives rise to counterintuitively non-zero values of the wavefunction. For 10 points, name this quantum process in which a particle crosses a classically forbidden barrier.

ANSWER: quantum **tunnel**ing [accept scanning **tunnel**ing microscope; accept **tunnel** diode]

<Physics>

2. This author described life as “an incessant shower of innumerable atoms” in an essay that urged writers to be “spiritualist” and not “materialist.” In a novel by this author, the narrator observes a “seven-sided” flower at a farewell dinner party for his India-bound friend. This author used the term “play-poem” to describe that novel, which consists of nine soliloquies delivered by six friends of the deceased Percival. Another novel by this author uses brackets to set off terse plot points from long imagistic passages in the stream-of-consciousness section “Time Passes,” which reveals that Prue died in childbirth. That novel by this author ends as Lily Briscoe finishes her painting and the Ramsay family sails to the title location. For 10 points, name this author of *To the Lighthouse*.

ANSWER: Virginia **Woolf** [or Adeline Virginia **Woolf**; or Adeline Virginia **Stephen**] (The essay is “Modern Fiction.” The first novel is *The Waves*.)

<British Literature>

3. This figure forced a man to create the demon Agrimas (“AH-gree-mahss”) during his 130-year fast. A book by Moses de León relates that, along with Naamah, this figure created the “plagues of humankind” and invades people’s houses when the moon wanes. The King James Bible translates this figure’s name as “screech owl.” Before this figure promised to allow one hundred demons to die every day, the angels Senoy (“seh-NOY”), Sansenoy (“sahn-seh-NOY”), and Semangelof (“seh-MON-jell-off”) attempted to drown her in the Red Sea. This woman asked her husband “why should I lie beneath you when I am your equal?”, prompting her to be banished from the Garden of Eden. For 10 points, name this she-demon from Judaic mythology, who is often called the first wife of Adam.

ANSWER: **Lilith** [or **Līlīṯ**; accept **Lamia**; prompt on lilin or lilu; reject “Eve”]

<Mythology>

4. The protagonist’s character arc in this novel borrows heavily from the author’s earlier novel about a white-passing planter’s son who leads a failed slave revolt and sinks a British warship while escaping. Tom Reiss argues that this novel reflects an incident in which unfriendly forces at Taranto (“TAR-on-toh”) surprised its author’s father, the first Black general-in-chief in his country’s army. This novel’s protagonist falls in love with Pasha’s daughter Haydée (“ai-day”), who was sold into slavery after her father was betrayed by Fernand de Morcerf. This novel’s protagonist saves Monsieur Morrel but bankrupts Danglars (“don-GLAR”) and drives Villefort (“veel-FOR”) insane. The Abbé Faria befriends this novel’s protagonist, who is imprisoned in the Château d’If (“shah-toh DEEF”). For 10 points, name this novel about Edmond Dantès’s quest for revenge, written by Alexandre Dumas (“doo-MAH”).

ANSWER: *The* ***Count of Monte Cristo*** [or *Le* ***Comte de Monte-Cristo***]

<European Literature>

5. Scientists from this country led a mass trial of the malaria drug Artequick in the Comoros (“KOM-uh-roze”). A loan from this country to David Dacko (“dah-VEED dah-KOH”) motivated the 1965 Saint-Sylvestre coup by Jean-Bédel Bokassa. The documentary *Racism for Sale* exposed Malawian “blessing videos” made for this country, whose film industry fictionalized its 2011 evacuation from Libya in *Home Coming*. eSwatini (“ess-wah-TEE-nee”) is the only African country that skips the FOCAC (“FOH-cack”) summit with this country, which funded Tanzania’s TAZARA (“tuh-ZAR-uh”) Railway to Zambia’s Copperbelt. This country’s 2012 Port of Doraleh and naval base in Djibouti led to charges of “debt-trap” and “Wolf Warrior” diplomacy. This country backed ZANU (“ZAH-noo”) and Siad Barre (“see-AWD bah-RAY”) during its “split” with the Soviets. For 10 points, what member of BRICS (“bricks”) launched “One Belt, One Road” and many Confucius Institutes?

ANSWER: **China** [or **Zhōngguó**; or People’s Republic of **China** or **PRC**; or **Zhōnghuá** Rénmín Gònghéguó; accept **Sino**-Soviet split; accept Forum on **China**–Africa Cooperation or **Zhōng** Fēi hézuò lùntán or Forum sur la coopération **sino**-africaine; reject “Republic of China”] (BRICS stands for Brazil, Russia, India, China, and South Africa.)

<World History>

6. In a project analyzing this process, up to 200 gigabytes of data a day were taken from the home of a subject by researchers from the MIT Media Lab led by Deb Roy. Roger Brown showed that people undergoing this process can display the “fis (“fiss”) phenomenon.” A 1965 book claimed that successful theories must explain this process and thus display “explanatory adequacy.” This process proceeds through “holophrastic” and “telegraphic” stages. This process, which some believe occurs despite a “poverty of the stimulus,” is broadly thought to only be possible before a “critical period” prior to puberty. For 10 points, Noam Chomsky’s Universal Grammar hypothesis claims that children have an innate ability to go through what process in which people become fluent for the first time?

ANSWER: first **language acquisition** [or **learn**ing a first **language**; or **L1** acquisition or **L1** learning; or **learn**ing to **speak** or **learn**ing **speech** or **develop**ing **speech** or **speech acquisition** or equivalents or word forms; prompt on development; reject “second language acquisition” or “L2 acquisition”] (The first line concerns the Human Speechome Project. The “fis phenomenon” involves children being able to distinguish spoken words like “fis” and “fish” before they can say them distinctly.)

<Social Science>

7. A character in this film flails in a broken chair as he screams “it ain’t the way I wanted it!” A shot in this film tracks two characters through a fence as they discuss the “little guys” in the Roman Empire. A sequence in this film follows a character traversing rooftops to intercept a man dressed in white during a procession of Christ covered in money. Near this film’s end, a character filmed in shadow recites the Hail Mary while fishing. This film fades into a shot of a boy’s Communion from a flashback of his immigrant grandfather as a boy singing to the Statue of Liberty. This film brings back a character from a previous film, Sonny, for a flashback in which the central family celebrates Vito’s birthday. For 10 points, name this second film in a Francis Ford Coppola trilogy about the Corleone family.

ANSWER: *The* ***Godfather Part II*** [accept *The* ***Godfather 2***; reject “*The Godfather*”]

<Other Fine Arts (Film)>

8. The pathway that produces this molecule recycles a substrate with MTK. A key step in the biosynthesis of this molecule is the formation of an achiral, cyclopropane-substituted amino acid. The response to this molecule is downregulated by a member of the raf family called CTR1. Regulation of ACC synthase is key to a pathway that ends in the synthesis of this molecule, which is named for Yang. This molecule stimulates exaggeration of the apical hook as part of the “triple response.” This molecule diffuses in the pericycle and inhibits the transport of IAA. In the absence of auxin, the abscission zone becomes sensitive to this molecule, resulting in plants shedding dead leaves. This hormone is the reason that one rotten apple spoils the bunch. For 10 points, name this gaseous plant hormone that promotes fruit ripening.

ANSWER: **ethylene** [or **ethene**; or **C2H4**]

<Biology>

9. A popular legend in this city holds that a pot of hot soup was poured over soldiers attempting to scale its defenses in 1602. Until a popular 1520 revolt ousted John the Bastard, this city’s bishopric was controlled by the House of Savoy. During a visit to this city, John Knox discovered a fellow theologian lawn bowling on the Sabbath. William Whittingham helped translate into English a Bible produced in this city that was later carried by Oliver Cromwell’s soldiers. After denouncing infant baptism, the polymath Michael Servetus fled to this city but was executed as a heretic. A prominent theologian who led this city wrote the *Institutes of the Christian Religion* and argued in favor of predestination. For 10 points, John Calvin served as a church leader in what Swiss city?

ANSWER: **Geneva** [or **Genève**; accept **Geneva** Bible]

<European History>

10. A symphony by this composer begins with a two-octave descending F-sharp minor arpeggio on staccato quarter notes in the first violins. The upper strings play a measure ahead of the lower strings in a minuet labeled “Canon in Diapason” (“dai-uh-PAY-zun”) by this composer of the “Mourning” Symphony. That structure was later used in the “Witches’ Minuet” of one of this composer’s string quartets. One of this composer’s Paris Symphonies quotes the first movement of an earlier symphony, which ends with only the first chair violinists playing. The premiere of that symphony, written for this composer’s patron Prince Esterházy, ended with musicians snuffing out candles and leaving the stage. For 10 points, name this composer of the “Farewell” Symphony.

ANSWER: Joseph **Haydn** [or Franz Joseph **Haydn**]

<Classical Music>

11. Oxidation of a shale portion of this mountain range produced a red-green color scheme that earned it the nickname “Candy Cane Mountains.” People of this mountain range may have drawn on Greek tales for their Nart sagas. The Ateşgah (“ah-tesh-GAH”) and Yanar Dağ (“yah-NAR dah”) were among the eternal flames that led a country in this mountain range to brand itself as the “land of fire.” Artificial drainage of this mountain range’s largest lake turned an island into the Sevan Peninsula. A mountain in this range is named for Shota Rustaveli (“SHOH-tah roose-tah-VEH-lee”), a medieval poet in one of its Kartvelian languages. Mount Elbrus is the highest peak in this mountain range, which contains the disputed territories of Abkhazia (“ab-KAH-zee-uh”) and Nagorno-Karabakh (“nah-GOR-noh kah-ruh-BAHK”). For 10 points, what mountain range between the Black and Caspian Seas spans countries like Georgia and Azerbaijan?

ANSWER: **Caucasus** Mountains [or **Qafqaz** or **Kavkaz**; or **Kavkasioni**; accept Greater **Caucasus**; accept Lesser **Caucasus** or **Caucasus** Minor]

<Geography>

12. On this holiday in the Philippines, youth participate in a noisy “mobile” practice in which they rev motorcycle engines and honk car horns. In South Asia, the night before this holiday is often marked by an observance called Chaand Raat. Before a prayer on this day, it is mandatory to give a donation of four double handfuls of food to the needy. A special prayer with typically 12 additional *takbirs* is said on this holiday, which begins after a crescent moon is sighted on the first of Shawwal (“shaw-WOL”). Sweets are often given to children on this holiday, which is considered the “minor” one of two yearly feasts and which celebrates the end of a period of fasting. For 10 points, name this Muslim holiday that marks the end of Ramadan, which occurs before a holiday partly called “al-ʾAḍḥā.”

ANSWER: **Eid al-Fiṭr** [prompt on Eid or Īd; prompt on Lesser Eid; reject “Eid al-ʾAḍḥā”]

<Religion>

13. This functional group on the *para* position of pyridine (“PEER-eh-deen”) is a common nucleophilic catalyst used to accelerate acyl (“ACE-ull”) substitution reactions. This functional group is coupled with aryl (“AIR-ull”) halides in the Buchwald (“BUCK-wald”)–Hartwig reaction. This functional group is difficult to monoalkylate (“mono-alkyl-ate”) and tends to form quaternary salts instead, such as during exhaustive methylation. An alkene and a tertiary example of this function group are products of the Hofmann elimination. Aniline (“ANN-eh-leen”) contains this functional group, which can react with acid chlorides to make amides (“AM-ids”). For 10 points, the rotting fish smell of cadaverine (“cadaver-een”) is attributed to what organic functional group derived from ammonia?

ANSWER: **amine**s (“uh-meens”) [accept electrophilic **amination** or Buchwald–Hartwig **amination**; accept O-benzoylhydroxyl**amine**s; accept dimethyl**amino**pyridine; reject “ammonium salts”]

<Chemistry>

14. Two standard objections to this concept are likened to a philosopher ascending and descending a mountain in a “Contemporary Introduction” to it by Robert Kane. A man named Black tries to ensure that Jones robs a bank in a prototypical example of problems that reject this concept called “Frankfurt cases.” This concept is analogized to having elbow room in a book by Daniel Dennett. Non-causal, event-causal, and agent-causal are three different stances of the “sourcehood” of this concept held by philosophical libertarians. Compatibilism holds that this concept exists in situations in which an individual isn’t coerced. For 10 points, determinists reject the existence of what concept that allows humans to make their own decisions?

ANSWER: **free will** [or **freedom** of the **will**; accept *A Contemporary Introduction to* ***Free Will***; prompt on moral responsibility; prompt on freedom; reject “responsibility”]

<Philosophy>

15. In a story by this author, a deal to return from college after four years is broken by Helen, forcing Maddy to look after their mother, who has Parkinson’s disease. In a story by this author, a man remembers the line “shoreless seas” from a Joaquin (“h’wah-KEEN”) Miller poem as his daughter enters the room. In that story by this author of “The Peace of Utrecht,” the protagonist stays at Judith’s house and inquires about her estranged daughter Nichola while visiting her father prior to his heart operation. This author wrote a story about a disabled girl from Greenhill School who plays a beautiful rendition of the title piece at Miss Marsalles’s piano recital. For 10 points, “The Moons of Jupiter” and “Dance of the Happy Shades” are by what Canadian short story writer?

ANSWER: Alice **Munro** [or Alice Ann **Laidlaw**]

<World Literature>

16. A biography by Richard Hingley discusses Mortimer Wheeler’s discovery of this ruler’s namesake “destruction horizon,” a red layer of ash. Thomas Thornycroft sculpted a scythed chariot driven by this ruler, who supposedly invoked the war god Andraste. Either this ruler of “kingly descent” or the contemporary Cartimandua of the Brigantes (“bree-GAHN-tays”) is referenced in a passage that states “they make a solitude and call it peace” in a speech attributed to Calgacus (“cal-GAH-cuss”). This whip-scarred ruler avenged the rape of two daughters according to the *Annals* of Tacitus, whose *Agricola* barely discusses this consort of Prasutagus sacking Camulodunum (“cam-oo-LOH-doo-num”) and Londinium. Around 61 CE, this ruler was defeated by Gaius Suetonius Paulinus at the Battle of Watling Street. For 10 points, what Celtic Iceni queen revolted in Roman Britain?

ANSWER: **Boudica** [or variants like **Boadicea** or **Boudicea** or **Buddug**; accept ***Boadicea*** *and Her Daughters;* accept **Boudiccan** destruction horizon or **Boudiccan** destruction layers; accept ***Boudica****: Iron Age Warrior Queen*]

<Other History>

17. A certain property can be “extracted” from multiple examples of these constructs using the Allen–Kennedy algorithm. These constructs are assigned to lattice points within a polytope and subjected to affine transformations in the polyhedral model. These constructs can be subjected to “fission” or “fusion” in order to exploit locality of reference. Provided that they are invariant, parts of these constructs may be “hoisted out” of them to improve their efficiency. If their trip count is known, these constructs can be optimized via “unrolling,” which is often performed by compilers. Like switch statements, break statements can be used to leave these constructs, in which a control variable is often incremented on each pass. For 10 points, “while” is a type of what sections of code that are repeatedly executed?

ANSWER: **loop**s [accept for **loop**s or while **loop**s or nested **loop**s; accept **loop** transformations, **loop** optimization, **loop** fusion, **loop** fission, or **loop** unrolling] (The Allen–Kennedy algorithm performs parallelism extraction in nested loops.)

<Other Science>

18. Allocation of this resource was the subject of the 1629 Charter of Freedoms and Exemptions. Thomas Devyr’s pamphlet *Our Natural Rights* inspired a conflict over this resource led by a group of self-styled “Calico Indians.” Speculation over this resource made the “Financier of the Revolution,” Robert Morris, go into debt. A war fought over this resource led to the break up of Rensselaerswyck (“REN-suh-lars-vake”). In the colony of New Netherland, access to this resource was controlled by agents termed *patroon*s. The Lenape gave up large amounts of this resource to the Dutch for just 24 dollars as a result of the so-called “Walking Purchase.” During Andrew Jackson’s presidency, ownership of this resource was removed as a barrier to voting. For 10 points, American acquisition of what resource was the subject of the Louisiana Purchase?

ANSWER: **land** [accept **land** patents; accept real **estate**; accept **manor**s; accept **patroonship**s until “patroons” is read]

<American History>

19. An artist from this empire created “mood landscapes,” such as one in which a woman walks down a tree-lined path on the title *Autumn Day*. Two artists from this empire painted a scene in which certain young animals climb over a fallen tree during a *Morning in* the title forest. A realist painting from this empire controversially included a drunk peasant in a religious procession. This empire was home to an artist who painted a group of laughing men writing an insulting letter to Sultan Mehmet IV, as well as to Isaac Levitan and the Wanderers. In a painting from this empire, a boy in rags stands up straight in a line of haggard old men pulling a boat up the title river. For 10 points, name this empire home to Ivan Shishkin and Ilya Repin, who painted *Barge Haulers on the Volga*.

ANSWER: **Russia** [or **Rossiya**; or **Russian** Empire or **Rossiyskaya** Imperiya; accept **Ukraine** or **Ukraïna**; accept **Lithuania** or **Lietuva**; accept Congress Kingdom of **Poland** or **Polska** or Królestwo **Polskie**] (Ivan Shishkin and Konstantin Savitsky painted bears in *Morning in a Pine Forest*. The painting in the third line is *Religious Procession in Kursk Governorate*.)

<Painting & Sculpture>

20. In a book [emphasize] *titled for* this person, a boy is rescued from a flood by his father’s murderer, who had previously stolen the man’s boat to save his pregnant wife. That book titled for this person features a story in which the protagonist escapes with a truck driver to Chicago after his friends are lynched for skinny-dipping in a whites-only pool. James Baldwin criticized this 19th-century character for being “robbed of his humanity and divested of his sex” in the essay “Everybody’s Protest Novel.” The story “Big Boy Leaves Home” appears in a Richard Wright collection titled for this character’s “children.” In a novel, this character refuses to divulge the location of Cassy and Emmeline, leading Simon Legree to order his death. For 10 points, name this enslaved character who titles a novel by Harriet Beecher Stowe.

ANSWER: Uncle **Tom** [accept *Uncle* ***Tom****’s Cabin*; accept *Uncle* ***Tom****’s Children*] (The first sentence refers to Richard Wright’s story “Down by the Riverside.”)

<American Literature>

TB. This composer claimed to be writing a “caricature of Romanticism” in a piece whose double-note scales are meant to imitate a pirouetting dwarf. The Ballets Russes commissioned a piece by this composer whose title characters embrace before dancers with tambourines enter the stage and perform a 5/4 (“five-four”) bacchanale. This composer’s Piano Concerto in G opens with a whip crack. This composer drew on Aloysius Bertrand’s (“al-oyze-YOOSE bair-TRON’s”) poems “Le gibet” (“luh zhee-BEH”), “Ondine,” and “Scarbo” in the three sections of a difficult piano suite. Paul Wittgenstein commissioned this composer’s Piano Concerto for the Left Hand. This composer of *Gaspard de la nuit* also wrote a piece with a repetitive, crescendoing snare drum ostinato. For 10 points, name this French composer of *Daphnis et Chloé* and *Boléro*.

ANSWER: Maurice **Ravel** [or Joseph Maurice **Ravel**]

<TB (Classical Music)>

Bonuses

1. After this opera’s premiere, its composer’s mentor Charles Gounod (“goo-NOH”) supposedly exclaimed, “take mine out of the score and there remains nothing to [its composer’s] credit but the sauce that masks the fish!” For 10 points each:

[10h] Name this opera that features a mezzo-soprano aria that was actually inspired by a Sebastián Iradier (“say-bahss-T’YAHN ee-rahd-YAIR”) song, though its composer believed he was adapting an old folk tune.

ANSWER: ***Carmen*** (The aria is “Habanera.”)

[10e] Gounod may have taken the high ground regarding his student Georges Bizet’s plagiarism in *Carmen* since he cribbed J.S. Bach’s melody for a setting of a Latin prayer titled “ave” this religious figure.

ANSWER: **Mary** [or the **Virgin** Mary; or the **Holy Mother**; or **Madonna**; or **Maria**; accept Ave **Maria**]

[10m] In the last feuilleton (“fooy-TON”) he ever wrote, Hector Berlioz took no issue with Bizet’s inspirations in a glowing review of his opera about two Ceylonese people with this profession, who sing a duet of friendship near the ruins of a temple.

ANSWER: **pearl** fishers [or **pearl**ers or **pearl** divers or **pearl** hunters; accept *The* ***Pearl*** *Fishers* or *Les pêcheurs de* ***perles***; prompt on fishermen or fishers or pêcheurs or divers; reject “hunters”]

<Other Fine Arts (Opera)>

2. The “reflow” type of this process is often used on surface mounts. For 10 points each:

[10m] Name this process that joins two metals using a substance with a [emphasize] *lower* melting point than the adjacent metal.

ANSWER: **solder**ing (“SOD-er-ing”) [accept reflow **solder**ing; reject “welding”]

[10e] Reflow soldering (“SOD-er-ing”) is used to connect the contact pads found on rectangular “boards” onto which these systems are printed. In these systems, electrical components are joined by wires.

ANSWER: electrical **circuit**s [accept printed **circuit** boards or **PCB**s]

[10h] When etching a printed circuit board, these materials stop the dissolution of copper in parts of the circuit board when UV light is shone on it. Microfluidics applications often use one of these materials called SU-8 (“S-U-8”).

ANSWER: photo**resist**s [prompt on epoxy resins or epoxy resins]

<Other Science>

3. A 2018 *VICE* exposé revealed that a piece of equipment central to this program is actually of extremely average size. For 10 points each:

[10m] Name this series of NPR concerts that take place near an eponymous piece of equipment that belongs to Bob Boilen, the radio host of *All Things Considered*.

ANSWER: NPR **Tiny Desk** Concerts [or National Public Radio **Tiny Desk** Concerts]

[10h] Despite battling the flu, this musician appeared on the Tiny Desk in 2017 to play songs from her mixtape *Telefone*. This rapper behind the album *Room 25* also runs a Black author-focused book club “for the homies.”

ANSWER: **Noname** [or Fatimah Nyeema **Warner**]

[10e] In her Tiny Desk concert, Lizzo played a solo on this instrument, in which she is classically trained. In September 2022, Lizzo played a 200-year-old one of these woodwind instruments once owned by James Madison.

ANSWER: **flute** [accept glass **flute** or crystal **flute**]

<Popular Culture>

4. Paris Herouni claimed that Armenia’s Carahunge was the world’s oldest of these institutions, which employed Taqi ad-Din in İstanbul and Abd al-Rahman al-Sufi in Isfahan. For 10 points each:

[10m] Name these institutions that were patronized by Hulagu Khan in Maragheh, Jai Singh II in Jaipur, and Ulugh Beg in Samarkand. Scholars at these places, like Jamshīd al-Kāshī, improved on the models in the *Almagest*.

ANSWER: **observatory** [or **observatories**; accept **astronomical** buildings or word forms such as **astronomy**; or **marsad** or al-**marasid** or **gözlemev**leri or **rasadxâne** or variants of those words] (Ptolemy wrote the *Almagest*.)

[10h] S. F. Starr’s *Lost Enlightenment* argues that al-Ma’mun stayed in this oasis city after the Fourth Fitna due to its observatory. In 1221, Tolui utterly destroyed this former capital of Margiana in modern-day Turkmenistan.

ANSWER: **Merv** [or **Merw** or **Marv** or **Marw** al-Shāhijān; accept **Mary**; prompt on Alexandria in Margiana or Antiochia in Margiana]

[10e] In the 12th century, Merv may have been the world’s largest metropolis due to its links to wealthy cities like Suyab, Otrar, and Kashgar along this series of Central Asian trade routes.

ANSWER: **Silk** Roads [or **Silk** Routes; or **Sīchóu** Zhīlù]

<World History>

5. In a novel by this author, Luis Molina recounts the plots of movies like *Cat People* to his cellmate Valentín Arregui (“vahl-en-TEEN ah-RAY-ghee”). For 10 points each:

[10m] Name this author of *Kiss of the Spider Woman*.

ANSWER: Manuel **Puig** (“pweeg”) [or Juan Manuel **Puig** Delledonne]

[10e] The fifth film that Luis recounts in *Kiss of the Spider Woman* is about a witch doctor who transforms people into these beings, who are often depicted as eating brains.

ANSWER: **zombie**s [or **zombi**s]

[10h] These sections in *Kiss of the Spider Woman* discuss Freudian theories of homosexuality. One of these sections in Jorge Luis Borges’s (“hor-HAY loo-EESS bor-HESS’s”) story “Tlön, Uqbar, Orbis Tertius” (“t’LERN UCK-bar OR-biss TER-shuss”) claims that “all men who repeat a line from Shakespeare are William Shakespeare.”

ANSWER: **footnote**s [or **endnote**s; prompt on notes]

<World Literature>

6. *Greek-language term required.* Xenophon (“ZEE-nuh-faun”) argued that nature possesses its own version of this concept that promotes intelligent design. For 10 points each:

[10h] Name this term in Greek philosophy often translated as “intellect.” This concept was first explained by Anaxagoras (“ann-aks-ZAYG-or-iss”), who claimed that it set the cosmos in motion and “has power over all things…that have soul.”

ANSWER: **nous** (“noose”)

[10e] Anaxagoras’s conception of nous (“noose”) is a precursor to this philosopher’s prime mover argument for the universe. This thinker’s texts include the *Metaphysics* and *Nicomachean* (“nih-koh-MAH-kee-in”) *Ethics*.

ANSWER: **Aristotle** [or **Aristotle** of Stagira or **Aristotélēs**]

[10m] Empedocles (“em-PEH-duh-kleez”) held that two nous-like beings named for this concept and strife created the universe. In a dialogue on this concept, the character Aristophanes (“air-ih-STAH-fuh-nees”) claims that Zeus separated early humans into two halves.

ANSWER: **love** [or **philotes**; accept **eros**] (The dialogue is Plato’s *Symposium*.)

<Philosophy>

7. This company employed slave labor from the Arbeitsdorf concentration camp at its factories in Wolfsburg. For 10 points each:

[10e] Name this company that was commissioned by Hitler to manufacture a car nicknamed the “Beetle.”

ANSWER: **Volkswagen** [or **VW**; accept **Volkswagen** Beetle]

[10h] Hitler promoted the Volkswagen Beetle as the “people’s car” as part of this initiative, which created the Autobahn. Robert Ley headed this initiative, which encouraged factory workers to engage in state-sanctioned leisure to improve morale.

ANSWER: **Strength Through Joy** [or **Kraft durch Freude** or **KdF**; prompt on German Labor Front or Deutsche Arbeitsfront]

[10m] The Krupp family, whose business also collaborated with the Nazis, used slave labor to manufacture this good. This good and “coal” name a European economic union that preceded the EEC.

ANSWER: **steel** [accept European Coal and **Steel** Community; prompt on alloys; prompt on ECSC by asking “what does that stand for?”; reject “metal” or “iron” or “Fe”]

<European History>

8. Prajāpati Daksha cursed this deity for showing favoritism to Rohinī over his 26 other wives. For 10 points each:

[10h] Name this god of poetry and vegetation who gave Indra the strength to defeat Vritra. He shares his name with a plant discussed at length in the ninth maṇḍala of the *Rigveda*.

ANSWER: **Soma** [accept **Chandra**ma; accept **Shashi**; accept **Nishakara**]

[10e] Soma was later syncretized with Chandra, the god of this object. The Sanskrit word “pūrnima” refers to this astronomical body when it’s at its fullest.

ANSWER: the **Moon** [or **Luna**; accept full **moon**]

[10m] The holiday Chaturthī (“chuh-TURR-thee”) observes when this deity injured Chandra for laughing at him for falling off his mount. While riding a mouse, this deity beat his brother Kārtikeya in a race around the world.

ANSWER: **Ganesh**a [or **Ganapati**; or **Vinayak**a; accept **Pillai** or **Pillai**yar; accept **Ganesh**a Chaturthī or **Vināyak**a Chaturthī or **Gaṇesh**ōtsav]

<Mythology>

9. An equation named for “makers” of these devices gives their power in diopters (“DAI-op-terz”). For 10 points each:

[10e] Name these devices whose “convex” type focuses light to a point.

ANSWER: optical **lens**es [accept convex **lens**es; accept **lens**makers’ equation]

[10m] The lensmakers’ equation simplifies for lenses with this property, as their width *d* is much less than their radii of curvature. The paraxial approximation is often paired with an approximation named for this kind of lens.

ANSWER: **thin** lens [accept **thin** lens approximation]

[10h] The thin lens equation sets [read slowly] the [emphasize] *reciprocal* of the lens’s focal length *f* as equal to this function of the object distance *u* and the image distance *v*. You have ten seconds.

ANSWER: **one over *u* plus one over *v*** [or the **reciprocal of *u* plus the reciprocal of *v***; or ***u* plus *v*** all **over *u*** times ***v***; accept **object distance** in place of “*u*”; accept **image distance** in place of “*v*”]

<Physics>

10. This author feuded with his colleague John Ozell for publishing a translation of the Italian mock epic *La secchia rapita* (“SECK-yah rah-PEE-tah”) at the same time as a poem by this author. For 10 points:

[10e] Name this English poet. The hack bookseller Edmund Curll titled Ozell’s translation *The Rape of The Bucket* in an attempt to capitalize off the success of this author’s poem “The Rape of the Lock.”

ANSWER: Alexander **Pope**

[10m] In retaliation, Pope inserted Curll as a prominent character in this mock-epic poem, in which Curll competes in a series of humiliating games overseen by Dulness, the goddess of stupidity.

ANSWER: *The* ***Dunciad***

[10h] This friend of Pope’s quipped that Curll’s biographies of deceased literati were “one of the new terrors of death.” Pope coined the phrase “who breaks the butterfly upon the wheel?” in a poem addressed to this man.

ANSWER: John **Arbuthnot** [accept “Epistle to Dr **Arbuthnot**”]

<British Literature>

11. Extracellular binding to this complex is translated into intracellular signals by two zeta chains that each possess three phosphorylation sites called ITAMs. For 10 points each:

[10h] Name this protein complex that most often presents as a heterodimer of an alpha and beta chain, but may sometimes be composed of a gamma and delta chain pair.

ANSWER: **T-cell receptor** [or **TCR**]

[10m] The TCR binds to peptides presented by this incredibly polymorphic glycoprotein complex that is needed to distinguish self from non-self. In humans, it is also called HLA, and its class I is present on all nucleated cells.

ANSWER: **MHC** [or **major histocompatibility complex**; accept **MHC** I or **MHC** class I]

[10e] While T cells mature in the thymus, they are originally produced in this tissue found within bones, where most blood cells are made.

ANSWER: bone **marrow**

<Biology>

12. A poem about this person asks, “Did her eyes slant in the old way?” in its section “Eidolon (“AI-doh-lon”)”. For 10 points each:

[10e] Name this mythological woman. A poem by H.D. titled for this woman “in Egypt” was based on a feminist reading of a Euripides play in which she is abducted by Paris for her beauty, inciting the Trojan War.

ANSWER: **Helen** of Troy [or **Helénē** or **Helena**; accept ***Helen*** *in Egypt*]

[10m] H.D. wrote *Helen in Egypt* as a response to this unfinished long poem, which rails against “usura” and was largely written while its author was imprisoned on treason charges in Italy.

ANSWER: *The* ***Cantos*** [accept *The Pisan* ***Cantos***] (by Ezra Pound)

[10h] This other modernist poet imagined Helen’s marriage to Faustus in a poem inspired by his affair with Emil Opffer, who also influenced an erotic six-part poem by this author that describes “bright striped urchins.”

ANSWER: Hart **Crane** [or Harold Hart **Crane**] (The other poem is “Voyages.”)

<American Literature>

13. In 2018, it was revealed that a statue of this woman would be unveiled in the US Capitol building to represent the state of Florida. For 10 points each:

[10h] Name this activist and educator who was the sole African-American woman on the committee that drafted the Charter of the United Nations. She was the only female member of the unofficial “Black Cabinet.”

ANSWER: Mary McLeod **Bethune** [or Mary Jane **McLeod**]

[10e] For helping to establish Cookman College in Daytona Beach, Bethune was awarded the Spingarn Medal by this organization. W. E. B. DuBois founded this organization to advance equality for African-Americans.

ANSWER: **NAACP** [or **National Association for the Advancement of Colored People**]

[10m] The “Black Cabinet” also pushed this organization to record over two thousand first-person accounts of former slaves. This Second New Deal organization employed hundreds of artists, musicians, and writers as part of Federal Project Number One.

ANSWER: **Works Progress** Administration [or **WPA**; or **Work Projects** Administration; accept **Federal Writers’ Project**]

<American History>

14. This author denounced rumors that he was secretly a member of the Illuminati in letters about one of his plays, which ends with the Marquis of Posa dying for Dutch liberty. For 10 points each:

[10e] Name this German playwright who wrote *Don Carlos* and the poem “Ode to Joy.”

ANSWER: Friedrich **Schiller** [or Johann Christoph Friedrich von **Schiller**]

[10h] This Schiller play begins with the jailer Paulet breaking into the protagonist’s desk. The protagonist of this play confronts her cousin and rival in a park outside her prison.

ANSWER: ***Mary Stuart*** [or ***Maria Stuart***]

[10m] *The Piccolomini* is the second play in a trilogy by Schiller titled for this Bohemian general. Macdonald and Devereux assassinate this character after his plan to enter an alliance with the Swedes is uncovered.

ANSWER: **Wallenstein** [or Albrecht von **Wallenstein** or Albrecht Wenzel Eusebius von **Wallenstein** or Albrecht Václav Eusebius z **Valdštejna**]

<European Literature>

15. The MP2 level of theory improves on the Hartree–Fock method by including this phenomenon. For 10 points each:

[10h] Name this phenomenon of electrons interacting with each other in a quantum system.

ANSWER: electron **correlation** [or **correlation** effects; or electronic **correlation**; accept **correlation** energy]

[10e] Correlation effects include repulsive forces that obey this law. This inverse square law relates electric force to the product of the charges involved.

ANSWER: **Coulomb**’s law

[10m] The Hartree–Fock method adopts this assumption, which leads to treating nuclei as stationary relative to the electrons. It is named for two physicists.

ANSWER: **Born–Oppenheimer** approximation [or **BO** approximation]

<Chemistry>

16. Answer the following about the career of psychologist James Coan (“KOH-in”), for 10 points each.

[10m] *Description acceptable.* As an undergraduate working under Elizabeth Loftus, Coan created the “lost in the mall” technique, in which these things were created in test subjects.

ANSWER: **false memories** [or **false memory**; or **confabulations** or **implanted memories**; accept any answers that indicate **memories** of events that **did not occur**; prompt on memories or memory]

[10h] With Lane Beckes (“behks”), Coan developed a “baseline theory” prefixed by this adjective. It’s not “organizational,” but Kurt Lewin (“luh-VEEN”) pioneered a branch of psychology named for this adjective.

ANSWER: **social** [accept **social** psychology; accept **social** baseline theory]

[10e] Coan used fMRIs to show that this emotion is reduced when people hold hands with their spouses. A condition known as “generalized [this emotion] disorder” is characterized by excessive worries about everyday events.

ANSWER: **anxiety** [accept generalized **anxiety** disorder; prompt on GAD by asking “what does that stand for?”]

<Social Science>

17. This person walks through a street populated by homeless people in a painting depicting him *Healing the Sick with his Shadow*. For 10 points each:

[10e] Name this saint whom many Renaissance paintings show crucified on an upside-down cross. Michelangelo’s *Pietà* is housed in a Vatican basilica named for this saint.

ANSWER: Saint **Peter** [or **Simon** Peter or **Simeon** or **Cephas** or **Petros** or **Petrus**; accept Saint **Peter**’s Basilica or Basilica di San **Pietro**]

[10h] This place of worship, located in the Church of Santa Maria del Carmine (“CAR-mee-nay”), features several depictions of Peter alongside scenes from the lives of other saints. A painting in this place depicts Peter pulling the title object from the mouth of a fish.

ANSWER: **Brancacci** (“brahn-KAH-chee”) Chapel [or Cappella dei **Brancacci**]

[10m] This artist painted the aforementioned fresco, *The Tribute Money*. Along with his associate Masolino, this artist created many of the depictions of Saint Peter in the Brancacci Chapel.

ANSWER: **Masaccio** (“mah-SAH-choh”) [or **Tomasso di Ser Giovanni** di Simone]

<Painting & Sculpture>

18. The *soggetto cavato* (“soh-JET-toh cah-VAH-toh”) system, an early type of musical cryptogram, used these syllables to represent the vowels of text in music. For 10 points each:

[10e] Name this set of seven syllables used to teach musical notes, starting with “do, re, mi.”

ANSWER: **solfège** (“sol-FEZH”) [or **solfeggio**; or **sol-fa**; or **solfa**; or **solfeo**; accept **hexachord**; prompt on solmization]

[10h] This composer, who invented *soggetto cavato*, used it to represent his patron’s name in the *Missa Hercules Dux Ferrariae* and to reference a story about Cardinal Sforza saying “Lascia fare mi” (“LAH-shah FAH-ray mee”) in the *Missa la sol fa re mi*.

ANSWER: **Josquin** des Prez(“zhoh-SKAHN day PRAY”) [or Josquin **des Prez**; or Josquin **Labloitte**]

[10m] Josquin des Prez used *soggetto cavato* to represent his own name in the piece *Illibata Dei virgo*, a piece in this genre. Thomas Tallis’s *Spem in alium* is also an example of this genre of sacred polyphonic vocal music.

ANSWER: **motet**

<Classical Music>

19. A lintel from this culture’s city of Yaxchilán (“yahsh-chee-LAHN”) depicts Lady Xoc (“shoak”) piercing her tongue in a bloodletting ritual. For 10 points each:

[10e] Name this culture whose city of Naranjo (“nah-RON-hoh”) allied with Calakmul (“kah-lock-MOOL”) under Lady Six Sky. Royal women from this Mesoamerican civilization included Sak Kʼukʼ of Palenque (“pah-LEN-kay”) and Lady K’ayam of Chichen Itzá.

ANSWER: **Maya** [or **Mayan**s; accept **Kʼiche**ʼ or **Tzeltal** or **Tzotzil** or **Chʼol** or **Qʼeqchi**ʼ or **Mopan** or **Lacandon**]

[10h] Stela 3 near this Maya city’s Caana pyramid highlights Ix (“eesh”) Batz’ Ek’s matrilineal power. This city in modern-day Belize shares its name with an observatory at Chichén Itzá, since both featured spiral-shaped structures.

ANSWER: **Caracol** [accept El **Caracol**; accept **Caracol** Stela 3] (The word “caracol” means “spiral” or “snail.” The observatory had a spiral staircase and the city had a winding road.)

[10m] Evidence for Maya women’s industry comes from Caracol’s many whorls, which weighted the “drop” type of these objects. The word “distaff” comes from centuries of women processing flax with these fusiform objects.

ANSWER: **spindle**s [accept drop **spindle**s; prompt on spikes or staffs]

<Other History>

20. Answer the following about the Gospel of Luke, for 10 points each.

[10e] The Gospel of Luke is sometimes paired with a book titled for the Acts of these people, which was also authored by Luke. These twelve followers of Jesus Christ included Thomas and Peter.

ANSWER: **Apostle**s [or the Twelve **Apostle**s; accept Acts of the **Apostle**s or Práxeis **Apostólōn** or Actūs **Apostolōrum**; accept the Twelve **Disciple**s]

[10m] The Gospel of Luke uniquely contains a parable about a rich man and a beggar with this name. The Gospel of John is the only gospel that includes the story of a man with this name from the town of Bethany.

ANSWER: **Lazarus** [accept **Lazarus** of Bethany; accept the rich man and **Lazarus** or **Lazarus** and Dives]

[10h] In the two-source hypothesis, this source is hypothesized to have provided material used by both the Gospels of Luke and Matthew, but not Mark.

ANSWER: **Q** source [or **Q** documents or **Q** gospels]

<Religion>

TB. The limiting ratio of successive intervals between “period-doubling” examples of these points gives the first Feigenbaum (“FAI-gun-baum”) constant. For 10 points each:

[10h] Name these points. One of these points that corresponds to complex conjugate eigenvalues crossing the imaginary axis is named for Hopf.

ANSWER: **bifurcation**s [accept **bifurcation** diagrams; accept **bifurcation** theory; accept Hopf **bifurcation**s]

[10e] Increasingly close period-doubling bifurcations are typical of this phenomenon, in which a system is highly sensitive to its initial conditions. This phenomenon is illustrated by the “butterfly effect.”

ANSWER: **chaos** [or **chaotic** behavior]

[10m] Bifurcation points of the logistic map’s Feigenbaum diagram correspond directly to where the real axis intersects the boundary of this shape, which contains a so-called “seahorse valley” next to its “main cardioid.”

ANSWER: **Mandelbrot** set [or **Mandelbrot** fractal]

<TB (Other Science)>