2022 ACF Winter

Packet 10 by Chicago C, Haverford A, Swarthmore A, Miami Ohio A

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Tossups

1. A variant of this quantity proportional to the Laplacian of the wavefunction’s amplitude *R*, all over *R*, arises in de Broglie–Bohm (“duh BROY-boam”) theory. A scenario in which this quantity takes two distinct values, which is solved by finding the intersections of “y equals x tan x” with certain circles, is spatially repeated in the Kronig–Penney model. A model in which this quantity depends quadratically on displacement is solved by using ladder operators. This function is infinite outside of a finite region, and zero inside of it, in the “particle in a box” model, which is also called this quantity’s namesake “well.” For harmonic oscillators, this quantity equals “one-half k x squared” and is often denoted *V*. For 10 points, the Hamiltonian equals kinetic energy plus what kind of energy that depends on position?

ANSWER: **potential** energy [accept finite **potential** well or infinite **potential** well; accept quantum **potential** or Bohm **potential**; prompt on V until read; prompt on energy]

<Physics>

2. A separatist movement in this historical state was named for a slang term for a “minor thing” and led its leader to raise the racist specter of “pardocracy” in a letter to the “man of the laws.” This state’s first president survived a September 25th assassination attempt after his lover helped him through a window. This state’s “fundamental law,” which named a former “royal audience” as a new department, was revised by the Constitution of Cúcuta (“KOO-koo-tah”) after its adoption at the Congress of Angostura (“on-go-STOO-rah”). This state’s 1830 Admirable Congress failed to prevent the secession of a country led by José Antonio Páez (“PAH-ace”), after which this state was reorganized as the Republic of New Granada. For 10 points, after the Battle of Pichincha (“pee-CHEEN-chah”), Ecuador was annexed by what republic led by Francisco Santander (“sahn-tahn-DAIR”) and Simón Bolívar from Bogotá?

ANSWER: Gran **Colombia** [or “Greater **Colombia**”; or Republic of **Colombia** or República de **Colombia**; prompt on Ecuador, Venezuela, Valencia, Panama, Guayana Esequiba, or Essequibo by asking “what historical state was it controlled by at the time?”] (The first line refers to La Cosiata. The second line refers to Manuela Sáenz. The “royal audience” was the Real Audiencia de Quito.)

<World History>

3. It’s not Machiavelli, but in a book on this thinker’s “reason and rhetoric,” Quentin Skinner argued his ideas must be understood through a contemporary “rhetorical culture.” A book by Steven Shapin and Simon Schaffer analyzed this thinker’s rejection of the void in one of his debates with Robert Boyle. This thinker was accused of atheism for a book that argued that the Ten Commandments had no “obligatory force of laws” and that misinterpretation of scripture was creating a “Kingdom” of ignorant people. This philosopher further developed his ideas from the book *De Cive* in another book that calls monarchism the best solution to avoid the state of nature, or “war of all against all.” For 10 points, name this English philosopher who wrote *Leviathan*.

ANSWER: Thomas **Hobbes** [accept *The Foundations of Modern Political Thought: Reason and Rhetoric in the Philosophy of Thomas* ***Hobbes***]

<Philosophy>

4. A tourism brochure to this island inspired a Michel Sardou song to which Belgian wedding parties twirl their napkins. In the 1960s, musicians from this island adopted the tenor banjo and an eight-string version of the Greek bouzouki. Listeners often think Middle Eastern countries are the origin of this island’s “old-style” séan-nos (“SHAH noce”) style of singing. Folk songs about this island include one about the “Rocky Road” to its largest city. A song about a robber from this island features nonsense “lilting” lyrics. The bodhrán (“BAO-ron”) drum and Uilleann (“ILL-yun”) pipes are used in the score of in an often-stereotypical theatrical show featuring this island’s music, titled *Riverdance*. For 10 points, a harp from what island appears on the logo of Guinness beer?

ANSWER: **Ireland** [or **Éire**; or **Airlann**; accept Republic of **Ireland** or Poblacht na h**Éire**ann; reject “Great Britain” or “United Kingdom”] (The song in the first line is “Les Lacs du Connemara.” The song about the robber is “Whiskey in the Jar,” popularized by the Dubliners.)

<Other Fine Arts (Mixed Auditory Arts)>

5. *Note to moderator: Read the answerline carefully.*

At this site, the “Autobiography of Harkhuf” describes a nomarch’s expedition to Yam in one of 200 painted “Tombs of the Nobles” at Qubbet el-Hawa. Naqada I (“one”) millstones were made from this site’s quarries of quartzite and red granite, where Hatshepsut built the Unfinished Obelisk. In 394 CE, the last known hieroglyphs were inscribed at this site south of Kom Ombo in Isis’s temple at Philae. This site at the First Cataract was the cult center of Satis, who formed a “triad” with Khnum near a nilometer on its island of Elephantine. In 1972, UNESCO designated the first World Heritage Sites after a project at this site motivated the International Campaign to Save the Monuments of Nubia; that project relocated the temples of Abu Simbel. For 10 points, Lake Nasser was formed by the construction of what Egyptian city’s High Dam?

ANSWER: ʾ**Aswān** [or **Souan** or **Swenet** or **Syene**; accept **Aswan** High Dam or **Aswan** Low Dam; accept **Abu Simbel** or **Philae** or **Qubbet el-Hawa** until each is read; accept **Elephantine** or Gazīrat **il-Fantīn** until “Elephantine” is read; accept **Ibhet** or **Bigeh** or **Agilkia**; prompt on Egypt or Miṣr; prompt on Nubia or an-Nūba or Nobīn until “Nubia” is read; prompt on First Cataract until read; prompt on Lake Nasser or Boħēret Nāṣer until read]

<Other History>

6. The scientist who first synthesized this group of compounds likened initial attempts to “placing an anvil on top of a house of cards.” The first total synthesis of this class of compounds used DCC to close the “enchanted ring,” concluding the work of John Sheehan’s group at MIT. The “folded book” geometry of these compounds bestows increased reactivity to their core structure. These compounds feature a five-membered thiazolidine (“THIGH-uh-zoll-ih-deen”) ring fused to a four-membered ring. Ernst Chain and Howard Florey pioneered the mass production of these compounds, resistance to which is conferred by beta-lactamase enzymes. These compounds bind to transpeptidases to inhibit cell wall synthesis. For 10 points, name this group of antibiotics discovered by Alexander Fleming.

ANSWER: **penicillin**s [or **PCN**; prompt on beta-lactams until “beta-lactamase” is read; prompt on antibiotics or Abx until “antibiotics” is read]

<Chemistry>

7. In an oratorio by this composer, the chorus sings “Happy and blest are they” at the end of the scene “The Stoning of Stephen.” The final chorus of another oratorio by this composer opens, “And then shall your light break forth.” This composer’s second string quartet uses the [read slowly] C sharp-B-D motif from his song “Ist es wahr” (“eest ez vahr”). This composer wrote a chamber piece whose scherzo was possibly inspired by the Walpurgis Night from Goethe’s *Faust*. This composer of the *St. Paul* and *Elijah* oratorios wrote a piece that imitates the braying of a man turned into a donkey. This composer wrote his string octet at age 16. The soloist enters almost immediately in this composer’s E minor violin concerto. For 10 points, name this composer who wrote incidental music for *A Midsummer Night’s Dream.*

ANSWER: Felix **Mendelssohn** [or Jakob Ludwig Felix **Mendelssohn** Bartholdy]

<Classical Music>

8. The doctor Selma wonders if her mother suffocated an infant in this country in the novel *I Owe Everything to Your Forgetfulness*. A journalist is sent to write about sanitation conditions in this country in a novel that opens with a smuggler trying to hang himself. A 2013 novel is narrated by the brother of an originally nameless character from an earlier novel set in this country who was murdered by a man suffering from heatstroke. In a novel set in this non-European country, Father Paneloux (“pah-nay-LOO”) interprets the title event as God’s punishment for sinners after dead rats fill the streets, and Dr. Bernard Rieux (“ree-OOH”) tries to heal patients in Oran (“oh-RAHN”). For 10 points, Albert Camus’s (“kah-MOO’s”) novel *The Plague* is set in what francophone North African country?

ANSWER: **Algeria** [or People’s Democratic Republic of **Algeria**; or L’**Algérie**; or République **algérienne** démocratique et populaire; accept French **Algeria** or **Algérie** française] (*I Owe Everything to Your Forgetfulness* is by Malika Mokeddem. The novel in the third line is *The Meursault Investigation.*)

<European Literature>

9. Daniel Matt is best known for translating a text from this tradition, whose last and largest main section is titled “The Faithful Shepherd.” In this tradition, evil is understood as existing in “the other side,” or *Sitra Achra*, and in husks or shells called qliphoth (“klee-FOHT”). A branch of this tradition is named for a 16th-century scholar who claimed that the universe’s creator had to first contract before making the world. Tzimtzum (“tseem-TSOOM”) is a theory from the Lurianic branch of this tradition, in which a tree diagram with ten or eleven nodes is used to represent order between elements of the world such as the sefirot, which are emanations of the Ein Sof. For 10 points, the *Zohar* is a foundational text of what tradition of Jewish mysticism?

ANSWER: **Kabbalah** [or **Qabbālā**; accept Lurianic **Kabbalah**; prompt on Judaism or Yahăḏūṯ until “Jewish” is read; prompt on Jewish mysticism until read]

<Religion>

10. In a short story set in this city, a butcher nicknamed “he who kills seven” torments a young man in the title “Slaughter Yard.” The narrator convinces his new wife to move into a house in this city that appears “made of sugar” in a story by an author whose sister founded this city’s literary magazine *Sur*. This capital city, the birthplace of Esteban Echeverría and the Ocampo sisters, is the setting of a story in which the narrator leaves a book he traded for a Wycliffe Bible in this city’s national library after discovering that it has infinite pages. In another story, lying on the nineteenth step of the staircase to Carlos Daneri’s cellar in this capital city allows the narrator to view every point in the universe. For 10 points, name this capital city, the setting of “The Aleph” and the birthplace of Jorge Luis Borges.

ANSWER: **Buenos Aires** [or Autonomous City of **Buenos Aires**; or Ciudad Autónoma de **Buenos Aires**; or CA**BA**]

<World Literature>

11. This family claimed descent from a knight who vanquished the giant Mugello while fighting for Charlemagne named Averardo. Pius II granted this family a monopoly on alum mining in Tolfa. A member of this family bribed his way into being exiled instead of facing execution after backing a failed invasion of the Republic of Lucca and was posthumously given the title of “Pater Patriae.” Supporters of this family supposedly shouted “Ball!” in reference to the five red balls on their coat of arms, which also features a fleur-de-lis. Sixtus IV backed a failed plot to kill this family’s head as part of the Pazzi conspiracy. Innovations like double-entry bookkeeping were popularized by this family’s patriarch Giovanni di Bicci. For 10 points, Cosimo I was from was a duke from what Florentine banking family?

ANSWER: House of **Medici** [accept Cosimo de’ **Medici** or Cosimo di Giovanni de’ **Medici**; accept Lorenzo de’ **Medici**; accept Giovanni di Bicci de’ **Medici**; accept Averardo de’ **Medici**]

<European History>

12. This author titles a one-sentence Lydia Davis story expressing this man’s indignance that a country “has so few trees.” The epigraph of *Pale Fire* is an anecdote in which this author is told of a cat-shooting maniac, but nevertheless assures the safety of his cat Hodge. Joseph Addison’s paper *The Spectator* inspired a series of didactic essays by this author called *The Rambler*. This author’s posthumous diagnosis of Tourette’s Syndrome is informed by a book that partially recounts a “tour of the Hebrides.” This author, who coined the name for the Metaphysical poets, published a 2,300-page book that refers to lexicography as a “harmless drudge.” For 10 points, James Boswell wrote a biography of what author of an 18th-century *Dictionary of the English Language*?

ANSWER: Samuel **Johnson**

<British Literature>

13. This artist painted his brother’s wife lying on a canapé and sitting in the title *Repose* in two portraits. In another painting by this artist, a woman with a green umbrella appears next to two painter friends, one of whom wears a white dress and holds a fan while sitting behind a green railing. This artist was the brother-in-law of the painter Berthe Morisot (“BAIRT moh-ree-zoh”) and painted her more than any other sitter, such as in *The Balcony*. A disproportionately tall woman bends over in the background of an 1863 painting by this artist, which includes his frequent model Victorine Meurent (“mur-AWN”). The foreground of that painting by this artist depicts two clothed men and a nude woman having a picnic outdoors. For 10 points, name this French artist of *The Luncheon on the Grass.*

ANSWER: Édouard **Manet** [reject “Monet”]

<Painting & Sculpture>

14. The title object of a poem by this author explains how it became “burned with dread” and “dried and dead” from “the curse of a guiltless man.” This author’s job at the Library of Congress informed a poem whose speaker imagines “when the sun is bright on the upland slopes.” This poet of “The Haunted Oak” described “vile clay / beneath our feet” and notes, “with torn and bleeding hearts we smile” in a poem from the collection *Majors and Minors*; that poem by this author anticipated W. E. B. Du Bois’s concept of double consciousness with an object that “grins and lies.” This author described a plea flung “upward to Heaven” in a poem that inspired the title of a memoir by Maya Angelou. For 10 points, name this author of “We Wear The Mask,” whose poem “Sympathy” includes the line “I know why the caged bird sings!”

ANSWER: Paul Laurence **Dunbar**

<American Literature>

15. These objects are held up by spike-covered platforms called “frogs” or *kenzan*. “Wife of Bath” and “A Shropshire Lass” are among the literarily named versions of these objects developed by David Austin. Until the 2010s, an enormous clock was used to sell these objects in a warehouse bigger than Vatican City in Aalsmeer. A Japanese proverb notes that people often prefer eating dumplings to looking at these objects during a custom called hanami. A Japanese art form called kadō or ikebana uses these objects, which are the subject of the song “Sakura, Sakura.” Extreme speculation created a bubble and so-called mania for a variety of these objects during the Dutch Golden Age. For 10 points, white weddings often arrange what objects into nosegays or posy bouquets?

ANSWER: **flower**s [accept varieties of flowers like **rose**s or **tulip**s; accept cherry **blossom**s; accept **flower** arrangement or **flower** frogs; accept **sakura** until read; accept **tulip** mania; accept **stalk**s or **stem**s; prompt on trees or plants]

<Other Academic>

16. A man from this culture was reborn as a hero after turning himself into a grain of wheat and being eaten by a witch. A historian named Gerald claimed that the people of this culture were skilled in alliterative verse due to being descended from Trojans. A hero from this culture was given forty impossible tasks by a giant, including killing a boar with a razor, comb, and pair of scissors in its hair. A book of this culture’s myths consists of four main “Branches,” the first of which tells of the birth of the hero Pryderi (“prih-DAIR-ee”). That book on this culture’s myths contains stories such as “Culhwch (“KEEL-hook”) and Olwen (“OLE-when”)” and “The Tale of Taliesin (“tahl-YES-in”).” For 10 points, the *Mabinogion* (“MAH-bin-OH-ghee-on”) relates the mythology of what constituent country of the United Kingdom?

ANSWER: **Welsh** culture [or **Welsh** mythology; or **Wales** culture; or **Cymru** culture; or **Cymraeg** culture; accept Gerald of **Wales**; prompt on British culture or Brythonic culture or Brittonic culture; prompt on Arthurian mythology; prompt on Celtic culture; reject “Irish” culture or “Gaelic” culture]

<Mythology>

17. They’re not sharks, but organisms in this phylum produce BMAA, a potent neurotoxin. BG11 and Z8 are common media for growing members of this phylum, whose subgroups include *Nostocales* and *Synecocchales*. Organisms in this phylum can essential material through dormant cells called akinetes. Organisms in this phylum form triple cell walls in their heterocysts, which they use for nitrogen fixation. Many anaerobic species went extinct due to this phylum’s production of toxic oxygen in the Great Oxygenation Event. Lynn Margulis provided experimental evidence showing that plastids such as chloroplasts originated from organisms in this phylum through endosymbiosis. For 10 points, name this phylum of photosynthetic bacteria that are sometimes named for their color.

ANSWER: **Cyanobacteria** [or **Cyanophyta**; accept **blue-green algae**; prompt on bacteria or Terrabacteria; prompt on algae]

<Biology>

18. These people are the subject of a book by Norman Nie, Sidney Verba, and John Petrocik that discusses their “changing” nature in the 1960s and ‘70s. The “funnel of causality” leads these people to form attachments according to a landmark 1960 study by four theorists from the University of Michigan. Duncan Black proposed a result named for one of these people that works similarly to Hotelling’s law. Gibbard’s theorem states that these people are incentivized to follow a strategy. According to a namesake theorem, any system that satisfies the Condorcet (“CON-dor-say”) criterion produces a result closest to the “median” one of these people. The number of these people divided by the number of eligible people gives the turnout. For 10 points, name these people who decide between candidates in elections.

ANSWER: **voter**s [or people who **vote**; accept American **voter**s; accept **elector**s or the **electorate** or people who participate in **election**s or similar until “elections” is read; accept median **voter** theorem; accept *The Changing American* ***Voter***; accept *The American* ***Voter***]

<Social Science>

19. This operation can be computed using the Woodbury identity, which is easily applied to Schur (“skur”) complements. The norm of an object, times the norm of this operation on the object, gives the condition number. A plus sign denotes a generalization of this operation used in least-squares analysis, which is named for Moore and Penrose. This operation can be computed first by forming the adjugate from the cofactors, which are themselves the sign-adjusted minors of the input, and then dividing by the determinant. This operation can only be computed for non-singular square inputs. This operation applied to a matrix, times the original matrix, gives the identity matrix. For 10 points, name this matrix operation denoted by a superscript “minus one.”

ANSWER: matrix **inverse** [or word forms such as **inversion**; accept Moore–Penrose pseudo**inverse** or generalized **inverse**]

<Other Science>

20. A governor from this family gave kickbacks to Tom Noe’s Capital Coins company, leading to the “Coingate” scandal. A politician from this family gave a speech at Kenyon College that denounced the Nuremberg Trials for imposing *ex post facto* statutes. That senator from this family vied bitterly with Dwight Eisenhower during the 1952 Republican presidential primaries. Ted Strickland succeeded a member of this family as Governor of Ohio. Another member of this family was the alphabetically later of two legislators who name an act that would have outlawed closed shops and was vetoed by Harry Truman. For 10 points, name this family that included a senator who co-sponsored a 1947 anti-union act with Fred Hartley, as well as the president who succeeded Theodore Roosevelt.

ANSWER: **Taft** [accept William Howard **Taft**; accept Robert A. **Taft** or Robert Alphonso **Taft** Sr.; accept Bob **Taft** or Robert Alphonso **Taft** III; accept **Taft**–Hartley Act]

<American History>

TB. An alkyl group transfers from this element to a nickel (II) (“two”) complex and forms a dihalide (“di-halide”) byproduct of this element in the transmetalation step of Negishi coupling. A carbenoid intermediate is formed by the complexation of alkenes to a couple of this element and copper in the Simmons–Smith reaction. An amalgam of mercury and this element in the presence of hydrochloric acid can reduce carbonyls to alkanes in the Clemmensen reduction. This metal’s primary ore is called sphalerite. Titanium oxide or this metal’s oxide is often added to inorganic sunscreen. Iron is coated with this metal in galvanization. For 10 points, what transition metal is alloyed with copper in brass and has the symbol Zn?

ANSWER: **zinc** [accept **Zn** until read; accept **zinc** oxide or **Zn**O]

<TB (Chemistry)>

Bonuses

1. The protagonist of a play set in this country describes how he stole the identity of the deceased man Robert while getting his picture taken for a fraudulent passbook. For 10 points each:

[10m] Name this country that was home to a group of “Serpent Players” who performed plays such as *The Island*.

ANSWER: **South Africa** [or Republic of **South Africa** or R**SA**; or **Ningizimu Afrika**, **Mzantsi Afrika**, **Suid-Afrika**, **Afrika Borwa**, **Afrika Dzonga**, **Afurika Tshipembe**, or **Sewula Afrika**]

[10e] Kani and Ntshona co-wrote *Sizwe Banzi is Dead* and *The Island* with this South African playwright. This author’s other plays include *Blood Knot* and *Master Harold...and the Boys*.

ANSWER: Athol **Fugard** [or Harold Athol Lanigan **Fugard**]

[10h] The refugee Saleh Omar uses the name “Rajab Shaaban Mahmud” to create a fraudulent passport in this author’s novel *By the Sea*. This non-South-African author wrote about the enslaved boy Yusuf in his historical novel *Paradise*.

ANSWER: Abdulrazak **Gurnah**

<World Literature>

2. This monarch, who was reported to smoke over 200 cigarettes a day, instituted a salute in which one places one’s hand over one’s chest, with the palm facing down. For 10 points each:

[10h] Name this monarch who fled his country after a 1939 invasion that included landings at Vlorё (“V’LOR-uh”).

ANSWER: King **Zog** I[orAhmed Muhtar Bey **Zogolli** or Ahmed **Zogu**]

[10e] Zog was overthrown as monarch of this country after it was annexed by Italy in 1939. The invasion was made easier because this country’s Radio Tirana attempted to deny its occurrence.

ANSWER: **Albania** [or Republic of **Albania** or **Shqipёri**a or **Shqipnia** or Republika e **Shqipёri**sё; accept **Albanian** Kingdom or Mbretёria **Shqiptare**]

[10m] Zog’s hopes of regaining his throne were dashed by the rise of this bunker-loving Communist dictator, who ruled Albania from 1944 until his death in 1985.

ANSWER: Enver **Hoxha** (“HOH-jah”) [or Enver Halil **Hoxha**]

<European History>

3. In a painting titled for one of these places, a large tree rises over the outline of a red cube in front of a building. For 10 points each:

[10h] Name this type of place outside Montroig, which the same artist also depicted in a painting in which an ear grows out of one tree while several flags, including those of France and Spain, are attached to another.

ANSWER: **farm** [or **masia**; accept *The* ***Farm***or *La* ***masia***; accept *The Tilled* ***Field*** or ***Terra*** *llaurada* or *La* ***terre*** *labourée*; prompt on earth or soil or dirt; prompt on estate or equivalents]

[10m] *The Farm* and *The Tilled Field* both depict the estate of this Catalan artist, who also painted *Dog Barking at the Moon*.

ANSWER: Joan **Miró** [or Joan **Miró** i Ferrà]

[10e] Miró was a member of this artistic movement. André Breton wrote manifestos for this movement, which also included René Magritte.

ANSWER: **Surrealism** [or **Surrealist**s; or **surréalisme** or **surrealismo**; accept **suprarealisme** or **superrealisme**; accept ***Surrealist*** *Manifesto* or *Manifeste du* ***surréalisme***]

<Painting & Sculpture>

4. Answer the following about transporting molecules against a concentration gradient, for 10 points each.

[10e] Active transport usually uses this molecule for energy. This energy currency of the cell is generated using a proton gradient by a rotor-like synthase molecule in the inner mitochondrial membrane.

ANSWER: **ATP** [or **adenosine triphosphate**]

[10m] SGLT proteins transport glucose across the membrane using a gradient of this positively charged ion. Tetrodotoxin inhibits channels that conduct this ion, which is pumped [emphasize] *out* of the cell by a common ATPase.

ANSWER: **sodium** [or **Na** or **Na**+ (“N-A-plus”)] (The common ATPase is the sodium–potassium pump.)

[10h] This type of membrane transporter transports one solute out of the cell at the same time as it transports another into the cell.

ANSWER: **antiporter** [or **exchanger** or **counter-transporter**]

<Biology>

5. A character with this occupation who is known as the “Foundling Father” claims that he does it in order to “follow in the Great Man’s footsteps.” For 10 points each:

[10h] Identify this occupation that another character abandons to return to three-card Monte with his brother in the play *Topdog/Underdog*.

ANSWER: Abraham **Lincoln impersonator** [or word forms; or **Lincoln reenactor**; prompt on impersonator or word forms by asking “of whom?”; prompt on actor, reenactor, or performer]

[10m] The “Foundling Father” appears in a play titled for this place by *Topdog/Underdog* author Suzan-Lori Parks. In another play titled for this place, the ghost of Ethel Rosenberg sings a Yiddish lullaby while a man dies of apparent liver cancer.

ANSWER: **America** [accept **United States** or **US**A; accept *Angels in* ***America***; accept *The* ***America*** *Play*]

[10e] Along with Lincoln impersonation, the Foundling Father performs this job in the “Great Hole of History.” In *Hamlet*, two characters with this job discover the skull of Hamlet’s childhood jester Yorick.

ANSWER: **gravedig**ger [or **gravedig**ging; accept **undertaker** or **mortician**; accept **sexton**]

<American Literature>

6. Answer the following about the Black–Scholes model for option pricing, for 10 points each.

[10e] The Black–Scholes model assumes that the market has at least one asset with a non-zero value for this quantity. Agents can display a namesake “aversion” to this measure of economic uncertainty.

ANSWER: **risk** [or word forms such as **risk**y; accept **risk** aversion; prompt on standard deviation or SD]

[10h] The Black–Scholes model can be used to plot the “implied” value of this quantity against strike price, which produces a characteristic “smile”-shaped graph.

ANSWER: **volatility** [accept implied **volatility**; accept **volatility** smile]

[10m] In the Black–Scholes model, volatility is measured by the standard deviation of the logarithm of this quantity, which is the change in value of an investment.

ANSWER: **return**s [accept rate of **return**; accept logarithmic **return**s]

<Social Science>

7. In the *Bhavishya Purāṇa* (“buh-VISH-yuh poo-RAH-nuh”), Krishna provides the textual precedent for exchanging these items. For 10 points each:

[10m] Name these white items that are tied around a Brahmin youth’s torso during the upanayana (“oo-puh-NAY-un-uh”) ceremony, which marks their initiation into education.

ANSWER: **thread**s [or sacred **thread**s or **string**s; accept **yajñopavīt**am or **janeu** or **jandhy**am; accept **rakhi**; prompt on talismans or amulets or bracelets]

[10h] A red thread bracelet is given by sisters to their brothers or male cousins as a symbol of protection on this holiday, which is celebrated on the last day of the month of Śrāvaṇa (“SHRAH-vuh-nuh”).

ANSWER: **Raksha Bandhan** [accept **Rakhi**, **Saluno**, **Silono**, or **Rakri**]

[10e] Along with red, thread of this color is often used in kautuka, or ritual protective bracelets. Some members of the Hindutva (“HIN-doot-vuh”) movement wear robes of this color that shares its name with an expensive spice.

ANSWER: **saffron** [or **bhagavā** or **bhagwa**; or **gerua**; accept **kesar**i or **kesar**iya; prompt on orange or yellow]

<Religion>

8. The book *The Orchid House* depicts the declining power of white planters in this country, where Cecil Rawle’s 1932 Pan-Caribbean conference envisioned the West Indies Federation. For 10 points each:

[10h] Name this country whose beaches were made public by the poet Edward O. LeBlanc. The Freedom Party head Eugenia Charles, who led this country for 15 years, was called the “Iron Lady of the Caribbean.”

ANSWER: **Dominica** (“dah-mih-NEE-kuh”) [or Commonwealth of **Dominica** or **Dominik**; or **Wai‘tu kubuli**; accept **Dominica** Freedom Party; accept 1932 **Dominica** Conference; reject “Dominican Republic”]

[10m] “Ross” in Dominica (“dah-mih-NEE-kuh”) and Eric Gairy’s “St. George’s” in Grenada (“gruh-NAY-duh”) were two of the first of these for-profit institutions that stereotypically attract low-achieving Americans in the Caribbean.

ANSWER: **medical** schools [or schools of **medicine**; accept **med** schools; accept **pharmacy** schools; accept offshore **medical** schools or Caribbean **medical** schools; accept Ross University School of **Medicine**; prompt on university or colleges or private schools or educational institutions; prompt on dual-campus schools]

[10e] This island contains a top-ranked Caribbean medical school and a post office that motivated Premier Vere Bird to pull out of the “Little Eight” federation. This Leeward Island forms a country with Barbuda.

ANSWER: **Antigua** (“ann-TEE-guh”) [accept **Antigua** and Barbuda; accept American University of **Antigua**]

<World History>

9. A piece by this composer was inspired by hearing the scarlet tanager’s song on a visit to Spillville, Iowa. For 10 points each:

[10e] Name this Czech composer of the *New World Symphony*.

ANSWER: Antonin **Dvořák** (“d’VOR-zhahk”) [or Antonín Leopold **Dvořák**]

[10h] Dvořák played this musical instrument. This instrument plays the opening melody [read slowly] rising F A, C D, F down to D over F major trills in the aforementioned tanager-inspired piece by Dvořák.

ANSWER: **viola** (The piece is the *American* String Quartet.)

[10m] Dvořák was the violist for the private premiere of this composer’s first string quartet, which is subtitled “From My Life.” This composer also wrote a set of six tone poems depicting his homeland.

ANSWER: Bedřich **Smetana** (The tone poems make up *Má vlast*.)

<Classical Music>

10. With Chandra Wickramasinghe (“WICK-rum-uh-sing-uh”), this astronomer developed a theory of panspermia, which some have claimed led to him not sharing the 1983 Nobel Prize in Physics. For 10 points each:

[10h] Name this astronomer who collaborated with Eleanor Burbidge, Geoffrey Burbidge, and William Fowler on a landmark 1957 paper about stellar nucleosynthesis.

ANSWER: Fred **Hoyle** (That publication is the B^2FH paper.)

[10e] Hoyle’s theory of panspermia claimed that life arrived on Earth aboard some of these icy astronomical objects, one of which with a 76-year period is named for Edmond Halley.

ANSWER: **comet**s [accept Halley’s **Comet**]

[10m] Hoyle’s work on panspermia arose from his investigations into the supposed organic nature of this substance in the interstellar medium. This substance causes interstellar reddening.

ANSWER: cosmic **dust** [or interstellar **dust** or space**dust**]

<Other Science>

11. A ruler of this kingdom called himself “citizen,” founded a Jacobin Club, planted a “liberty tree,” and commissioned a musical automaton that depicted a redcoat being eaten by an animal. For 10 points each:

[10h] Name this kingdom that Charles Cornwallis besieged after its invasion of Travancore (“TRA-vun-core”), forcing it to become one of the largest princely states. Congreve rockets built on this kingdom’s artillery.

ANSWER: **Mysore** (“mai-SOAR”) [or **Mysuru**; or Kingdom of **Mysore** or Sultanate of **Mysore**; accept Anglo–**Mysore** Wars; accept **Mysore** State; accept “Tiger of **Mysore**”; accept **Mysorean** rockets; prompt on Karnāṭaka by asking “that state is based in what kingdom’s territory?”] (The first line refers to Tipu Sultan and his tiger.)

[10m] This empire allied with the British and Hyderabad (“HAI-dar-ah-bod”) in its wars with Mysore (“mai-SOAR”). Shivaji founded this Deccan Hindu “Confederacy,” whose peshwas (“paysh-vahz”) directed naval conquests from Pune (“POO-nuh”) before its defeat by the British in 1818.

ANSWER: **Maratha** Confederacy [or **Maratha** Empire; accept Third Anglo–**Maratha** War; accept **Maratha**–Mysore Wars]

[10e] Baji Rao I conquered Portugal’s Fort Vasai (“vuh-suh-ee”) near this Marāṭhī (“muh-RAH-tee”) speaking city, which became the seat of the westernmost British presidency. Dadasaheb Phalke (“dah-dah-SOB pahl-kay”) pioneered this city’s Bollywood film industry.

ANSWER: **Mumbai** [or **Bombay**; accept **Bombay** Presidency or **Bombay** Province]

<Other History>

12. In this modern-day country, medieval Jewish poets such as Yehuda Halevi (“yeh-HOO-dah hah-LAY-vee”) promulgated a genre of homoerotic poetry. For 10 points each:

[10m] Name this modern-day country in which kharjas, the final refrains of longer poems, often referred to male lovers as beloved cupbearers. The French playwright Pierre Corneille adapted an epic from this country in which a knight rescues his daughters after his sons-in-law tie them up.

ANSWER: **Spain** [or **España**; or Kingdom of **Spain** or Reino de **España**; prompt on al-Andalus or Andalusia or Andalucía by asking “in what modern-day country is it located?”] (The epic poem is the *Cantar de mio Cid*.)

[10h] Kharjas make up most of the extant literature in this language, the vernacular of Muslim Spain. This term refers to the medieval Romance varieties spoken in al-Andalus, often written in non-Latin scripts as aljamiado (“ahl-hah-MYAH-doh”).

ANSWER: **Mozarabic** [or **mozárabe**; or **Andalusi Romance**; or **romandalusí**; prompt on Latinus; reject “Arabic”]

[10e] Sephardic poets used Mozarabic kharjas as the endings of longer muwashshahs (“moo-WASH-shahs”) in Ladino or this language. The Israeli poet Yehuda Amichai mainly used the modern form of this language.

ANSWER: **Hebrew** [or ʿ**Īvrīt**; accept Medieval **Hebrew** or Modern **Hebrew**]

<European Literature>

13. This god is held to be the stepfather of Ullr (“OOLZ”), the god of archery and skiing. For 10 points each:

[10m] Name this god who fathered Módi with the giantess Járnsaxa. Another of this god’s sons rescued him from being crushed by the frost giant Hrungnir.

ANSWER: **Thor** [or **Donar**; or **Thuner**]

[10h] Módi, Magni, and Thrúd are attested to as children of Thor in this section of the *Prose Edda*. This section is named after a Swedish king who poses questions to the sages High, Just-As-High, and Third.

ANSWER: ***Gylfaginning*** [accept *The* ***Beguiling of Gylfi*** or *The* ***Deluding of Gylfi*** or equivalent translations]

[10e] Thor’s children are prophesied to survive this event, during which Thor dies in battle with the World Serpent. This event is commonly thought of as the Norse apocalypse.

ANSWER: **Ragnarök** [or **Ragnarøkkr**; prompt on “Twilight of the Gods”]

<Mythology>

14. Answer the following about the philosophy of the Buddhist Abhidharma (“ub-hee-DUH-muh”) texts, for 10 points each.

[10e] Various Abhidharma texts hold that this Buddhist concept connects impermanent phenomena. This concept is the idea that people’s good or bad actions affect their future.

ANSWER: **karma** [or **kamma**]

[10m] The theory of *khāṇavāda* developed by the texts is an atomized conception of this concept, which they held was in constant flux. Saint Augustine held that this concept is created by the mind, explaining how God exists outside of it.

ANSWER: **time** [accept **momentariness**; accept the **present** or the **future**; prompt on uji]

[10h] The texts outline an early theory of consciousness and this property, holding that it is always required for active cognition. A book by G. E. M. Anscombe lays out three different applications of this property to actions.

ANSWER: **intention**al [accept **intention**ality; accept **citta**; accept ***Intention***]

<Philosophy>

15. The Howard Hughes Corporation now owns a Honolulu building commissioned by this company with a honeycomb-esque brise soleil (“breez so-LAY”). For 10 points each:

[10h] Name this company for whom Eliot Noyes hired Charles and Ray Eames to make the *Powers of Ten* films. Alexander Calder’s reptilian sculpture *Saurien* (“sohr-YAWN”) sits under a building nicknamed for this company at 590 Madison Avenue.

ANSWER: **IBM** [or **International Business Machines** Corporation; accept **IBM** Building] (The brise soleil resembles the punched cards that were once ubiquitous in the computing industry.)

[10m] IBM rejected this architect’s plans for a skyscraper headquarters in 1969. This architect created a glass “tent” as a symbol of musical expression for a building on Lake Erie.

ANSWER: I.M. **Pei** [or Ieoh Ming **Pei**] (The building is the Rock & Roll Hall of Fame in Cleveland, Ohio.)

[10e] Noyes commissioned Ludwig Mies van der Rohe’s last American building at the former “IBM Plaza” at 330 North Wabash in this city, whose “Loop” features skyscrapers like the Willis Tower.

ANSWER: **Chicago** [accept **Chicago** Loop]

<Other Fine Arts (Architecture)>

16. Answer the following about the inhabitants of Mesa Verde National Park, for 10 points each.

[10e] Mesa Verde was first settled in phases designated “I” and “II” of a culture named for producing these objects. Southwestern tribes used yucca fibers to weave these objects, which were then used to carry other goods.

ANSWER: **basket**s [accept **Basket**maker I or **Basket**maker II; prompt on containers]

[10m] Inside Mesa Verde’s Cliff Palace, the Ancestral Puebloans created several of these rock carvings that depict people and animals. A national monument near Albuquerque, New Mexico contains thousands of these images.

ANSWER: **petroglyph**s [or **petrograph**s; accept rock **relief**s; accept **Petroglyph** National Monument; reject “pictographs” or “pictograms”]

[10h] The construction of multi-tiered “great houses” around Mesa Verde suggest that it was once inhabited by people who migrated from this other site in New Mexico. Pueblo Bonito and Chetro Ketl are among the 150 “great houses” in this canyon.

ANSWER: **Chaco** Canyon [accept **Chaco** Culture National Historical Park]

<American History>

17. Tetrachloroethylene (“tetra-chloro-ethyl-ene”) and depleted uranium were among nearly 400 contaminants detected at one of these sites on K2 Air Base in Uzbekistan. For 10 points each:

[10h] Give this two-word name for hazardous sites that harmed soldiers on bases in Iraq, Afghanistan, and Djibouti. The PACT Act extends VA health care benefits for several cancers caused by toxins at these sites.

ANSWER: **burn pit**s [prompt on pits; prompt on burn sites or fires; prompt on waste disposal sites or garbage disposal sites or equivalents] (K2 is Karshi-Khanabad Air Base. The PACT Act stands for Promise to Address Comprehensive Toxics Act.)

[10e] One of the most common presumptive conditions caused by burn pits is this airway disease, whose disproportionate incidence in Pahokee, Florida and the South Bronx causes many Black children to use inhalers.

ANSWER: **asthma**

[10m] The main pollutant in burn pit smoke is “fine matter” described by this adjective, which causes Barrio Logan, San Diego’s high asthma rate in a textbook case of environmental racism. This word names “coarse” PM10 (“P-M-ten”) that may be suspended in aerosols.

ANSWER: **particulate** [accept fine **particulate** matter or coarse **particulate** matter or suspended **particulate** matter; accept atmospheric aerosol **particles**]

<Current Events>

18. This copolymer can be sourced from brown seaweed. For 10 points each:

[10h] Name this compound with M- and G-blocks that forms a thick polysaccharide gum upon hydration. Exposure of this gum to calcium ions leads to the formation of spheres that can hold flavor molecules.

ANSWER: sodium **alginate** [accept **alginic** acid or **algin**]

[10m] Sodium alginate is a popular tool in this field of cooking that applies physics and chemistry to food prep. A recipe in this field involves using maltodextrin to make Nutella powder.

ANSWER: **molecular gastronomy**

[10e] Another technique in cooking chemistry is to heat a thin layer of fat on a pan made of this metal. Fat bonds to pans made of the “cast” form of this metal to “season” them.

ANSWER: **iron** [or **Fe**; accept cast-**iron** pans]

<Chemistry>

19. The periodical *Mischmasch* notes that this time period’s name derives from a Welsh word meaning “to broil,” as it implies a time when one begins broiling things for dinner. For 10 points each:

[10m] Name this time of day, suggested to be equivalent to four in the afternoon. A boy with a “vorpal sword” slays a “manxome foe” while “slithy toves / gyre and gimble” in a poem that begins, “twas” this fictional time of day.

ANSWER: **brillig**

[10e] Humpty Dumpty relates the meaning of terms like “brillig” and “mimsy” from the nonsense poem “Jabberwocky” to this girl, the protagonist of Lewis Carroll’s novel *Through the Looking-Glass*.

ANSWER: **Alice**

[10h] The final poem in *Through the Looking-Glass* is an acrostic that imagines this sort of object “beneath a sunny sky.” Edward Lear’s nonsense poem “The Owl and the Pussy-cat” describes a “pea-green” one of these objects.

ANSWER: **boat**s [accept “a beautiful pea-green **boat**”; reject “ships” or other putative equivalents]

<British Literature>

20. In low-defect crystals, resistivity arises from these quasiparticles scattering off each other in Umklapp (“UM-clap”) processes. For 10 points each:

[10m] Name these collective excitations that form the basis for the Debye (“duh-BAI”) model of heat capacity. The name of these quasiparticles refers to how long-wavelength examples of them correspond to sound waves.

ANSWER: **phonon**s [accept acoustic **phonon**s; reject “photons”]

[10e] Debye’s model predicts that, at low temperatures, heat capacity is proportional to this power of temperature. The proof uses the fact that the volume of a sphere is proportional to this power of radius.

ANSWER: **3** [or **three**; or **third** power; or **cube**d]

[10h] The Debye model also works at high temperatures, because it exactly matches this function denoted by lower-case *g*. Given an energy level, this function gives the number of particles that can exist in it.

ANSWER: **density of states** [or **DOS**; prompt on density]

<Physics>

TB. This instrument likely evolved from instruments in the tanbur family during Mughal rule, rather than from instruments such as the veena. For 10 points each:

[10m] Name this common instrument in Hindustani music that was the primary instrument of Ravi Shankar.

ANSWER: **sitar** [or **sitāra**]

[10h] Shankar’s main teacher was Allauddin Khan, who played this other stringed instrument and created several rāgas. Ali Akbar Khan was a virtuoso on this fretless, plucked instrument, which has a deeper sound than the sitar.

ANSWER: **sarod**

[10e] Because Hindustani zeelaf ragas consist of five svaras (“SWUH-ruhs”), they correspond to the scale named by this term. This type of scale omits two pitches from the typical diatonic scale, and thus has five notes per octave.

ANSWER: **pentatonic** scale

<TB (Classical Music)>