

## Chicago Open 2015

Packet by Brother-in-Law of Mayonnaise (Mike Bentley, Ben Zhang, Benji Nguyen, and Chris Grubb)

1. The 2014 KDD conference gave a test of time award to a 1996 paper by Kriegel et al that proposed an algorithm for accomplishing this task which improved upon the CLARANS algorithm to work against data sets of arbitrary shapes. The branching factor is a parameter to an algorithm that performs this task and generates a Characteristic Feature Tree as implemented in the BIRCH module for Python's scikit-learn library. A noise-resistant algorithm to perform this task is called DBSCAN. One algorithm for accomplishing this task is similar to Lloyd's algorithm (\*) and attempts to minimize the WCSS within the namesake number of inputs. A popular way of doing this task is to iteratively update membership using distance to the nearest representative centroid as the criterion, then updating the centroid; that algorithm is called k-means. These types of algorithms are unsupervised, unlike algorithms for the related problem of classification. For 10 points, name this type of algorithm used in machine learning to put similar items into groups.

ANSWER: clustering algorithm [or cluster analysis algorithms]

2. In a surah of this name, a man performs strange activities such as helping workers of an inhospitable town repair a wall and removing planks from a boat after the pilot did not charge him a fare. That same man, al-Khidr, kills a youth who would have grown up and caused his parents to lose faith in a surah of this name where he's visited by Moses. A figure described in a surah of this name is responsible for erecting an iron barrier between Gog and Magog. A surah named for one of these places was revealed after some Jews posed three questions to Muhammad, one of which asked him to identify the figure of Dhul-Qarnayn. The 18<sup>th</sup> or (\*) Al-Kahf surah is named for one of these places. In another story, one of these places called Ghar al-Thawr is used as a hiding space, but when the Quraysh come a spider spun a web at its entrance. While in another of these places, a figure is instructed to "read" three times, each time replying that he cannot; that occurs on the Night of Power. For 10 points, name these places, one of which near Mount Hira was the location where Muhammad received his first revelation.

ANSWER: a cave

3. This government often employed Bernard Jean Bettelheim as a translator. One leader of this kingdom was nicknamed "the mute" and mostly gave up power to the Council of Three. The "Bridge of Nations" bell was cast by this nation, parts of which underwent the "Sugar Hell" after its annexation. After an invasion, one leader of this polity swore an oath of fealty called the Fifteen Injunctions. The first ruler of this kingdom united the separate polities of Chuzan, Hokuzan, and Nanzan, and aimed to prevent revolution by a group of lords called the aji. Leaders of this nation lived in (\*) Shuri Castle and belonged to the Sho family. This kingdom periodically sent tribute ships to China and was also annexed after a 1609 invasion by the Satsuma domain. This kingdom was formally abolished in 1879 by the Meiji government. For 10 points, name this kingdom that ruled an arc of islands including Okinawa.

ANSWER: Ryukuan Kingdom [prompt on anything mentioning "Okinawa" or "Japan"]

4. In the larghetto second movement of a piece of this type and number, the trombones enter to play in a *pianissimo* coda after having been silent the whole movement. The final movement of another piece of this type and number begins with the unaccompanied first violins repeatedly "struggling" to complete a scale starting on G, but once they reach the F above, the music breaks into *allegro molto e vivace* tempo. The opening *adagio molto* section of that piece begins with a secondary dominant seventh chord which gives the impression of starting in the wrong key because it (\*) resolves to the subdominant of F. The second and third movements of a piece of this type and number were originally titled *Evening* and *Merry Playmates* respectively, and the final movement borrows the final theme from its composer's *Kreisleriana*. That piece was written following encouragement from the composer's wife Clara after their marriage the previous year. For 10 points, identify this number held by Beethoven's only symphony in C major, as well as by one in B-flat major by Robert Schumann which is named "Spring."

ANSWER: first symphonies [or Symphony No. 1; "symphonies" is not required after it is read]

5. In this essay, the narrator remembers seeing a movie ironically called *This Land is Mine* before walking outside and feeling a physical "click" at the base of his neck. At the end of its first section, its narrator describes walking into a fashionable restaurant where the apologetic tone of a waitress made him "colder and

more murderous,” causing him to pick up a mug of water and throw it at her with all his strength. Its author recalls being asked “You would rather write than preach, wouldn’t you?” as the only time he and its central figure had ever really spoken. This essay describes its author’s rage at being told “We don’t serve (\*) Negroes here,” and ends with a section about the funeral of the author’s father, which took place on the same day of a race riot in Harlem. It’s the title essay of a 1955 collection that also includes “Many Thousands Gone” and “Everybody’s Protest Novel.” For 10 points, name this essay by James Baldwin whose title riffs on a novel by Richard Wright.  
ANSWER: “Notes of a Native Son”

6. Several rulers of this polity were served by the admiral Eugenius who was also a distinguished intellectual at this polity’s court, translating Ptolemy’s *Optics* into Latin during his time there. A ruler of this polity allied with the antipope Anacletus and captured Innocent II, forcing the latter to recognize his title. Hugo Falcandus chronicled the reign of another ruler of this kingdom, who was given the sobriquet “the Bad;” that ruler, William I, was succeeded by a son, William II, who was called “the Good.” For four years, this polity was ruled by Tancred of Lecce, who launched an unsuccessful rebellion against the emperor Henry VI (\*) and was its last Norman ruler. The first ruler to hold the title of “king” of this polity was Roger II. This polity confusingly had to change its name to Trincarnia after concluding the Treaty of Caltabelotta with a neighboring polity that assumed its name; that treaty ended a rebellion in this polity launched against its Angevin ruler, Charles I, by Peter III of Aragon. For 10 points, identify this island polity, the site of a massacre of French civilians during its namesake “Vespers.”

ANSWER: Kingdom of Sicily [do not accept or prompt on “Kingdom of the Two Sicilies”]

7. Wigner and Weisskopf were the first to derive the delta function spectrum of this process at low intensities. At high intensities, the spectrum of this process in a simple two-level driven system takes on the form of three Lorentzians, consisting of a central peak and two sidebands that peak at the central frequency plus or minus the Rabi frequency, a result known as the Mollow triplet. Carmichael and Walls first derived the result that showed that a single-atom version of this process would demonstrate photon anti-bunching, or, the tendency of the emitted light to be spaced coherently, an effect observed experimentally by Kimble. Though it is not the Raman effect, this process can exhibit a phenomenon in which the time required for emission results in an energy loss, known as the (\*) Stokes shift. The efficiency of this process, which emits photons that have sub-Poissonian statistics, is usually measured by a ratio called the quantum yield. For 10 points, identify this process in which a stimulated system re-emits light at a different frequency.

ANSWER: fluorescence [accept word forms]

8. Characters in a novel with this title break the window of Nikitaris’ Fish Shop in order to fulfill a wish of a dead colleague who imagined the fish as prisoners. The protagonist of a novel with this title works with Squizzy Taylor to save a man from gangrene, and has an affair with Amy, the proprietress of the King of Cornwall inn. It’s the name of a novel about the Australian surgeon Dr. Richard Evans, who tries to save other POWs building the Burma Death Railway. This name is shared by a (\*) Richard Flanagan novel that won the 2014 Booker Prize, and a book that begins with the line “Days and months are travellers of eternity.” The diary of Kawai Sora revealed that the author of that book was writing poetry instead of recording his experiences. The haibun of this title was written in the late 17th century, and describes its author’s visit to the Bridge of Heaven at Matsushima and the Ise Shrine. For 10 points, identify this title of a travel diary written by Basho.

ANSWER: The Narrow Road to the Deep North [accept The Narrow Road to Oku; or The Narrow Road to the Interior; or Oku no Hosomichi after “Days”]

9. In an essay about this man, he is described as the third of three great images of the modern age, with the first being Rousseau and the second being Goethe. In that essay, this man is praised as a teacher because of his honesty, cheerfulness, and steadfastness. In the preface to one of his works, this philosopher describes a different philosopher as “a colossal piece of mystification” that would “qualify as an inmate for Bedlam.” That work identifies compassion as the only true non-egoistic motive (\*) and claims that everything is a manifestation of will. In a different work, this philosopher compared life to a pendulum, and his ideas would lead another philosopher to develop the concept of the “will to power.” This philosopher is described as “an educator” in one of Nietzsche’s *Untimely Meditations*. This student of Fichte despised the work of Hegel and critiqued Kant’s use of the “thing-in-itself.” For 10 points, identify this philosopher who wrote *On the Basis of Morality* and was famed for his pessimism.

ANSWER: Arthur Schopenhauer

**10. Among the many alternate names that have been used for this island are the Evangelist Island, Grapefruit Island, and Island of 500 Murders. Most of the Southern part of this island is taken up by a National Park known as Lanier Swamp, while a cave on its eastern point contains some well-preserved Ciboney pictographs. The United States gave up claims to this largest island in the Canarreos Archipelago in the Hay-Quesada Treaty, while its capital and largest city Nueva Gerona [hey RO nah] (\*) was founded in 1830 by colonial governor Francisco Dionisio Vives. Other attractions include the estate where Jose Martí spent 9 weeks before being shipped off to exile in Spain and the Panopticon-style prison that held the perpetrators of the Moncada Barracks attack. Renamed in 1978 for the Communist training camps for high-schoolers established here by Fidel Castro, for 10 points, name this Cuban island known for its coniferous forests.**

ANSWER: or Isle of Youth or Isle of Pines or Isla de la Juventud [Prompt on “Cuba”, I guess]

**11. In a letter named for this character’s cigar, Susan Sontag analyzed a scene in which this character twice offers a cigar to a man who he had just rescued from drowning. With the help of his aunt Asie, this character rescues a young man nicknamed “Madeleine” from execution before becoming chief of the police. This character is accused of the murder of a woman who kills herself after sleeping with a baron she had been seducing for months. This character has the letters “T” and “F” branded (\*) on his shoulders, which is discovered after this character becomes unconscious from drinking drugged wine. At one point, this man adopts the guise of Abbe Carlos Herrera, a role in which he tries to swindle Baron de Nucingen with the help of Esther and Lucien. This man’s real name is Jacques Collins, and he appears in such works as *Lost Illusions*, *Scenes of a Courtesan’s Life*, and *Father Goriot*, in which Eugene Rastignac aids in his arrest. For 10 points, identify this criminal, a recurring character from Honore de Balzac’s *Human Comedy*.**

ANSWER: Vautrin [accept Jacques Collins or Abbe Carlos Herrera before mention]

**12. A child holds a blue life buoy next to this man, who is waving from a boat, in the painting *Strive Forward in Wind and Tides*. Erro Gudmundur depicted this man visiting Venice in riff on a popular painting of this figure that depicts him carrying an umbrella and wearing a plain garment. A 14-foot tall portrait of this man at the Art Institute in Chicago depicts him with blue eyeliner and rouge on his cheeks. The sculpture *Legacy Mantle* consists solely of three of this man’s iconic (\*) jackets. Three men were removed from the crowd that stands to his left in the painting *The Founding Ceremony of a Nation*. A contrapposto portrait of this figure as a young man in a Caspar David Friedrich-like cloudy mountain setting was printed some 900 million times and depicts him travelling to Anyuan. For 10 points, name this world leader, the subject of numerous silkscreen paintings by Andy Warhol based on an portrait originally included in this man’s *Little Red Book*.**

ANSWER: Mao Zedong [or Chairman Mao or Mao Tse-tung]

**13. This man was pursued unsuccessfully by an old woman who chased him while on a flying water lily leaf and shot poisoned darts at him through a hole in the leaf. After this man’s death, Aonghus Eng would reanimate his corpse periodically to converse with him. This man killed a giant named Searban who had been guarding the berries of the forest of Dubros, and used those berries to help a friend of his win three straight fidchell games against that friend’s father. This man unwisely chose to use the sword Beagaltach and the spear (\*) Gae Buidhe instead of the longer Moralltach and Gae Dearg, which resulted in his death at the hands of a boar. Despite the threats of Oscar and Oisín, Finn MacCool let water that would have prevented this man’s death slip from his hands in revenge for this man’s theft of Finn’s fiancée. For 10 points, name this lover of Grainne who possessed a magical love spot on his forehead.**

ANSWER: Diarmuid of the love spot [or Diarmuid Ua Duibhne; or Diarmuid O’Dyna]

**14. In 1995, Cirac and Zoller created the first controlled NOT quantum gate using one of these devices. These devices can be used to create systems of geonium atoms, which can be represented as electrons bound to the Earth. A magnetized nickel wire wrapped around one of these devices can create a bottle field, which can be used to measure the properties of its contents. These devices have been used to record the most accurate measurements of the electron’s magnetic moment to date. Samples are sent into a quadrupole example of these devices and then spun in Fourier transform ICR (\*) mass spectrometry. The development of one of these devices earned Hans Georg Dehmelt and Wolfgang Paul the 1989 Nobel Prize in Physics. A type of these devices used by CERN’s ALPHA experiment to store antimatter was developed by Frans Michel Penning. For 10 points, name these devices that use combinations of electric and magnetic fields to isolate and capture charged particles.**

ANSWER: **ion traps** [accept **Penning traps** until “Penning” is read; accept **Paul trap** until “Paul” is read; prompt on partial answer]

**15. This man’s second wife, Marie-Madeleine de Castille, conducted a salon from his library at Saint Mande, a residence also equipped with a lab where he personally conducted experiments under the supervision of Jean Pecquet. Under this minister, a tapestry workshop was founded at Maincy. The judge Olivier d’Ormesson fell from power after siding with this man during his trial. The comedy *The Bores* (\*) was written for one event hosted by this man, who commissioned Andre Le Notre to design some 50 fountains for his estate. This man was imprisoned in Pignerol after his sentence of exile was commuted. His downfall came after giving a lavish celebration at his Vaux-le-Victome estate, which resulted in the discovery of this man’s embezzlement. Three weeks later, this last man to hold the post of *surintendant des finances* was arrested by D’Artagnan. For 10 points, name this nobleman and rival of Jean-Baptiste Colbert who was prominent during the early reign of Louis XIV.**

ANSWER: Nicolas **Fouquet** [or Nicolas **Foucquet**]

**16. A recent paper by Ashok, Kuziemko, and Washington reports that public opinion in favor of this concept has declined among the elderly, thanks to the non-universal coverage of Medicare, and among African-Americans for unclear reasons. According to the title of a book by Casey Mulligan, this concept caused the Great Recession. Kuziemko, Norton, Saez, and Stantcheva report that people who are explicitly told how much they would benefit from this concept erases the partisan opinion gap on issues like raising the (\*) Estate Tax and the Minimum Wage, erasing most of the partisan opinion gap on those issues. In a model by Meltzer and Richard, this concept occurs through progressive taxation because political power is more equitably allocated than income or wealth. For 10 points, what is this concept that usually refers to the transfer of resources from richer to poorer people?**

ANSWER: **redistribution**

**17. It’s not Oregon or California, but Lansford Warren Hastings wrote a guide for American emigrants to this country. Upon taking office, Jimmy Carter tried to pressure this country to abandon a nuclear deal it made with West Germany. Percy Harrison Fawcett and his son vanished on an expedition in this country. The US intervened in this country in Operation Brother Sam and also helped put down is 1893 naval mutiny. Americans in this country congregated in the settlement of Santa Barbara. The LBJ administration provided support to a 1964 military coup in this country which overthrew a man popularly known as (\*) “Jango.” The majority of Confederados fled to this country. George W. Bush made a 2007 agreement to co-promote ethanol with this market leader in that product. An American main street was built in this country’s city of Fordlandia. For 10 points, name this country once ruled by Luiz Inacio Lula da Silva.**

ANSWER: **Brazil**

**18. This artist riffed on traditional Catalan *caganer* figurines for a pair of sculptures called *Silver Moon* and *Blue Moon*, which were exhibited in Berlin as part of his *Blue Rider* exhibit there. One of his early works featured “7 Bitches Tossing their Pussies before” the other title objects. Over 100 of his watercolor busts of men and women with crazy hairstyles were exhibited at his one-man show *Afro Muses*. This artist, who works from Port of Spain in Trinidad, incorporated baby teeth and some of his own hair into a sculpture for which the primary material was collected from the London Zoo. One of his paintings includes collaged images of cut-out (\*) buttocks of porn stars, which stand in for angels. This first black artist to win the Turner Prize sparked a controversy when Rudy Giuliani threatened to cut funding for the Brooklyn Museum due to the sacrilegious nature of that painting. For 10 points, name this artist of *Shithead* who used elephant dung to create a 1996 painting of the *Holy Virgin Mary*.**

ANSWER: Chris **Ofili**

**19. One member of this class of proteins is fused with the monoclonal antibody tucotuzumab in a drug that targets the EpCAM surface protein on cancer cells. One member in this family of molecules stimulates bone resorption by osteoclasts following decreased estrogen activity, thereby contributing to osteoporosis. The disorder X-SCID is caused by mutations in the receptor for one type of these proteins, and those receptors generally contain a common gamma chain. The first and eighteenth one of these proteins is activated by a complex containing PYCARD and caspase-1, called the (\*) inflammasome. TNF and one of these proteins can contribute to a breakdown of the blood-brain barrier during inflammation. Stimulating T cells with ionomycin and**

PMA will primarily induce them to produce interferon gamma and one of these compounds. For 10 points, name these cytokines which are named for their role in signaling between white blood cells.

ANSWER: interleukins [prompt on “cytokines”]

**20. In a later version of this play, some messages never get to Cambray due to the actions of a character who begins the story having forged and delivered a letter. That character hopes that his father may be a king since his mother was unchaste, and says that he will be like Jove to Semele while attempting to rape the heroine, who asks her confidant Arante to disguise her as a man. The dedicatory epistle of that version described this play as “a heap of jewels unstrung and unpolished.” In this play’s fourth act, a character calls his wife “thou changed and self-covered thing” after telling her (\*) “wisdom and goodness to the vile seem vile; filths savour but themselves.” Its final scene is set at a camp near Dover, where its title character dies of grief, exclaiming “Never, never, never, never, never!” During the Restoration, audiences preferred the version of this play written by Nahum Tate, who gave it a happy ending. For 10 points, name this Shakespeare tragedy which ends with the title character mourning his daughter Cordelia.**

ANSWER: *King Lear* [or *The History of King Lear*; or Nahum Tate’s version of *King Lear* before “Nahum Tate”]

Extra/TB

The title character of a novel by this man has a dream where he receives a bottle whose liquid, when applied to iron, turns the iron into gold. This man left Philadelphia to found a town named for his partner, John Nininger. To prove one theory, this man read through a corpus of text counting the frequencies of words such as “Nicholas” and “Francis” versus words such as “William” and “spur”. This “Prince of Cranks” argued in *The Cipher in the Plays and on the Tombstone* that Francis Bacon was the true author of the plays of William Shakespeare. The narrator of one of his novels approaches New York City by airship to find it controlled by a financial oligarchy in the far-off year of 1988. Eight years after this man wrote the preamble to the Omaha Platform, he was the running mate for Wharton Barker of the People’s Party in the 1900 presidential election. For 10 points, name this writer and Minnesota Populist who wrote the utopian novel *Caesar’s Column*.

ANSWER: Ignatius Donnelly [or Ignatius Loyola Donnelly]

1. Let's see what you know about knowing things. Answer the following questions related to epistemology for 10 points each.

[10] This philosophical position argues that we can't be certain we know anything. It was advocated by Sextus Empiricus and Pyrrho of Elis, who names a school of this doctrine.

ANSWER: **skepticism**

[10] This epistemological framework, contra skepticism, claims that a person can "know" some proposition p if said person has a true justified belief in p and acquired that belief in p through the namesake kind of process. This theory of knowledge and justification is championed by such figures as Alvin Goldman and Alvin Plantinga.

ANSWER: **reliabilism** [accept word forms like **reliable** or **process reliabilism**]

[10] This G.E. Moore work attempts to debunk the skeptical position using the namesake method, which involves the author claiming "here is one hand" and "here is another."

ANSWER: **Proof of an External World**

2. Nehemiah Chapter 8 describes how Ezra restored this tradition, in a form that may be the model for modern practice. For 10 points each:

[10] Name this activity often performed by between 3 and 7 olim and followed by the haftarah on Shabbat.

ANSWER: **reading the Torah**

[10] Since it is forbidden to touch the Sefer Torah with the hand, this instrument—consisting of a pencil-sized rod with a tiny hand affixed to the end—can be used by the oleh to keep their place.

ANSWER: **yad**

[10] Unlike the handwritten Sefer Torah, a printed Torah suitable for study is known by this term derived from the Hebrew word for "five".

ANSWER: **Chumash**

3. Answer the following about dangerous chemicals, for 10 points each:

[10] At UCLA, Sheri Sangji died after accidentally exposing a compounding consisting of a butyl group bonded to an ion of this element to air. That tert-butyl form of this element is a pyrophoric, strong reducing agent.

ANSWER: **lithium** [or **Li+**]

[10] A doctoral student at Texas Tech lost several fingers after he attempted to break up clumps of nickel hydrazine perchlorate with this set of tools, which are used to grind substances.

ANSWER: **mortar** and **pestle**

[10] This Dartmouth chemistry professor died after a drop of dimethylmercury passed through her latex glove diffused into her skin while researching the role of mercury ions in DNA repair.

ANSWER: Karen **Wetterhahn**

4. This novel ends with Redrick Schuhart sacrificing Arthur Barbridge to the "meatgrinder," after which Schuhart reaches the Golden Ball, to which he is only able to say, "Let there be free happiness for everyone, and let no one go away disappointed." For 10 points each:

[10] Identify this novel in which the Pillman line is home to six "Zones" which are routinely traversed by "stalkers" looking for "artifacts."

ANSWER: **Roadside Picnic** or **Picnic at the Roadside** [or **Piknik na obochine**; accept reasonable equivalents; find Jerry if in doubt]

[10] *Roadside Picnic* was written by these two brothers, with first names Boris and Arkady, who are generally considered to be giants of Soviet-era science fiction. They also wrote the screenplay for Tarkovsky's adaptation, "Stalker."

ANSWER: **Strugatsky**

[10] The Golden Ball being sought by Schuhart and other stalkers is an artifact alleged to have this power; in a W. W. Jacobs short story, this power is possessed by the titular "Monkey's Paw."

ANSWER: **grant wishes** [accept obvious equivalents]

5. An early English-language text advocating this position was A. J. P. Taylor's *The Course of German History* which argued that "the history of Germany is a history of extremes". For 10 points each:

[10] Identify this school of historiography which holds that the rise of a Nazi-like state in Germany was all but inevitable. This school's name comes from the unusual road Germany took to get from monarchy to democracy.

ANSWER: Sonderweg school [or special path school]

[10] William L. Shirer's *The Rise and Fall of the Third Reich* traces a direct link between this German and Hitler, arguing that this theologian had a "ferocious [belief] in absolute political authority". That belief is supported by this man's tract, "Against the Murderous, Thieving Hordes of Peasants".

ANSWER: Martin Luther

[10] Liberal Weimar culture, often blamed for giving rise to the Nazis by Sonderweg historians, was explored in a 1968 book by this historian. He also wrote *The Enlightenment: An Interpretation* and the 1988 biography, *Freud: A Life for Our Time*.

ANSWER: Peter Gay

6. Identify the following about silver-fork novels, for 10 points each.

[10] The term originated with "The Dandy School," a review by this critic complaining that novelist Theodore Hook was obsessed with silver forks of the nobility. This author of *The Spirit of the Age* outlined how man alone among animals enjoys the incongruous in his 1819 essay "On Wit and Humor."

ANSWER: William Hazlitt

[10] This author wrote one of the earliest silver-fork novels, *Vivian Grey*. This future prime minister examined the plight of the working class in his novel *Sibyl*.

ANSWER: Benjamin Disraeli

[10] The character Mr. Bungay in this Thackeray novel is based on Henry Colburn, a publisher of silver-fork literature. Its snobby title character eventually ends up with Laura Bell on his estate at Fair Oaks after his doting uncle, the Major, hatches various marriage plots involving a husband of Jemima Amory.

ANSWER: *The History of* Pendennis: *His Fortunes and Misfortunes, His Friends, and His Greatest Enemy*

7. She was killed by her son Alcmaeon after the death of her husband Amphiaraus. For 10 points each:

[10] Name this sister of Adrastus who was bribed with the necklace of Harmonia to convince her husband to join the Seven Against Thebes.

ANSWER: Eriphyle

[10] This brother of Eteocles gave the necklace to Eriphyle. He and his brother killed each other in a duel outside of Thebes, and the prohibition on his body's burial was broken by his sister Antigone.

ANSWER: Polyneices

[10] Alcmaeon attempted to use the necklace of Harmonia to win the hand of this king's daughter Arsinoe. When Alcmaeon tried to go back on his word, this king's sons, Agenor and Pronous, killed him.

ANSWER: Phegeus

8. The title character of this opera falls in love with Giuseppe Hagenbach, the enemy of her father Stromminger. For 10 points each:

[10] Identify this favorite opera of Arturo Toscanini, which climaxes with an avalanche which kills Hagenbach, driving the title character to take her life.

ANSWER: La Wally

[10] The libretto for Catalani's *La Wally* was written by Luigi Illica, who also penned the libretto to this composer's opera *Manon Lescaut*. You may know him better for his opera *Gianni Schicchi*.

ANSWER: Giacomo Puccini

[10] Near the end of the first act, Wally sings this famous aria after she decides to leave her home rather than marry a man she does not love. She follows it up by departing for the mountains.

ANSWER: "Ebben? Ne andrò lontana" [or "Well then? I'll go far away"]

9. These units often drew from the exact same men as those who participated in fox hunts. For 10 points each:

[10] Identify this force of part-time country cavalry in England, whose Nottinghamshire contingent was founded in 1794. They were not obliged to serve in overseas armies, although an "Imperial" contingent of them served in the Second Boer War.

ANSWER: Yeomanry

[10] The Yeomanry helped carry out this massacre on August 16th, 1819 in Manchester. This massacre took place after the 15th Hussars and the Cheshire Volunteers were sicced on a crowd that had gathered to hear Henry Hunt speak.

ANSWER: Peterloo Massacre

[10] Another British domestic force active during the Napoleonic Wars were the militias, many of which were concentrated at this town. This town became popular thanks to seawater enthusiast Richard Russell, whose clients included the future George IV.

ANSWER: **Brighton**

10. Seth Powsner and Edward Tufte proposed revising these entities to incorporate a high-information graphic that automatically includes Weed's classification. For 10 points each:

[10] Identify these things, whose narrative type generally includes progress notes. Many of these things contain SOAP notes.

ANSWER: **medical charts** [or **medical records** or **health records**]

[10] Edward Tufte is a fan of this man's graphic of Napoleon's invasion and retreat from Russia which included six separate variables on a single chart. This French engineer also made a figurative map of Hannibal Crossing the Alps.

ANSWER: Charles Joseph **Minard**

[10] Minard used a similar technique of tan lines of different widths on a gray map in order to show the export of this good from France. An American-based aphid nearly destroyed this industry in France in the 19th century, and it is a major industry in Languedoc.

ANSWER: **wine**

11. This man's painting of the *Head of Christ* in the Met is based on a now-lost Van Eyck painting, but adds gory new details such as blood dripping down from the Crown of Thorns to Christ's chest. For 10 points each:

[10] Identify this Netherlandish artist who brought geometric perspective and the vanishing point to Northern Europe with his *Virgin Enthroned with Saints Jerome and Francis*. This artist of *Portrait of a Carthusian* was Bruges' leading painter, along with Memling, in the generation after van Eyck.

ANSWER: Petrus **Christus**

[10] The medieval craze for the Veil of Veronica, or Holy Face, led many other artists to paint small devotional portraits of Christ, such as this Flemish artist whose *Judgment of Cambyses* was one of the first Northern Renaissance paintings to include Italian-style putti.

ANSWER: Gerard **David**

[10] This later artist's *Munich Self-Portrait* is a riff on the Holy Face motif. This German artist of *Praying Hands* and *The Four Apostles* holds a thistle in an early self-portrait.

ANSWER: Albrecht **Durer**

12. John Rick analyzed the acoustics of the central building in this place, noting that it was designed to encourage a feeling of sounds coming from every direction at once. For 10 points each:

[10] Identify this archaeological site in Peru, where religious rituals took place as early as 1200 BCE. The only entrance to the Old Temple at this site faced the Mosna River to the east.

ANSWER: **Chavin de Huantar** [prompt on partial answer]

[10] Members of this other civilization of Ancient Peru removed dark stones and replaced them with lighter stones to create geoglyphs in the shape of a hummingbird, monkeys, lizards and other figures.

ANSWER: **Nazca** [or **Nasca**]

[10] The Nazca culture created the still-standing Puquios, which are structures of this sort. Another one of these structures named for Chapultepec was engineered by Nezahualcoyotl and stands over the Sevilla metro station.

ANSWER: **aqueduct**

13. These phenomena can be called "subcritical" or "supercritical" depending on whether they result in an unstable limit cycle around a stable equilibrium point, or a stable limit cycle around an unstable equilibrium point. For 10 points each:

[10] Identify these phenomena in the theory of dynamical systems which result when a periodic solution either arises or disappears as a parameter in the system crosses some critical value.

ANSWER: **Hopf bifurcation** [prompt on partial answer]

[10] Hopf bifurcations are characteristic of systems undergoing this behavior, characterized by extreme sensitivity to perturbations in the initial conditions.

ANSWER: **chaos**

[10] For systems approaching chaos through period doubling, the convergent limit of the ratio of bifurcation intervals and the ratio between the width of a tine and its sub-tine are these two constants that govern universal



behavior in many chaotic systems.

ANSWER: Feigenbaum constants

14. A one-time governor of North Carolina named John Owen supposedly helped convert this man to Christianity. For 10 points each:

[10] Identify this Tukolor Fula who was captured and brought to America as a slave, where he wrote a noted Arabic-language slave narrative.

ANSWER: Omar Ibn Said

[10] Although some Muslim-inspired music was preserved by slaves brought to the United States, drumming was banned following the 1739 Stono Rebellion in this colony. The Citadel in this state was founded following Denmark Vesey's rebellion.

ANSWER: South Carolina

[10] Some members of this Native American tribe were hired by the government to track down runaway slaves from the Stono Rebellion. Unlike the closely related Choctaw, they were allies of the British rather than French, and they signed the Treaty of Hopewell along with the Cherokee.

ANSWER: Chickasaw

15. The central characters of this play are obsessed with a radio that they nickname "Marconi." For 10 points each:

[10] Identify this Brian Friel play in which the five unmarried Mundy sisters reminisce about performing the title action. It is narrated by Michael Evans, who describes his childhood to the audience.

ANSWER: Dancing at Lughnasa

[10] *Dancing at Lughnasa* is often cited as an example of a "memory play," a term coined by Tennessee Williams to describe this play, in which Tom describes his mother Amanda's attempts at finding Laura a "gentleman caller."

ANSWER: *The* Glass Menagerie

[10] In this one-act memory play, Deborah wakes up after three decades of sleeping but still maintains the mind of a sixteen-year old. It premiered in 1982, and was inspired by Oliver Sacks's book *Awakenings*.

ANSWER: A Kind of Alaska

16. Answer the following about ketogenic diets, for 10 points each:

[10] When following a ketogenic diet, it is important to not ingest too much protein, as this metabolic pathway can convert amino acids into glucose and throw you out of ketosis. This pathway converts pyruvate, lactate and other carbon compounds into glucose during starvation.

ANSWER: gluconeogenesis

[10] In ketogenesis, fatty acids undergo beta oxidation to form acetyl-CoA, which is eventually used to synthesize this ketone body. This substance can be detected in urine with nitroprusside strips, and it can either decompose to acetone or oxidize to form beta-hydroxybutyrate.

ANSWER: acetoacetic acid [or diacetic acid or acetoacetate or diacetate or acac]

[10] Unlike humans, plants can convert acetyl-CoA from fatty acids into usable carbohydrates through this pathway. This pathway requires the enzymes malate synthase and isocitrate lyase.

ANSWER: glyoxylate cycle

17. This poem repeats "Farewell to an idea..." at the start of its second, third, and fourth sections, and begins "This is where the serpent lives, the bodiless." For 10 points each:

[10] Name this title poem of a 1950 poetry collection which ends with "Angel Surrounded By Paysans" and was published three years after its author's collection *Transport to Summer*.

ANSWER: "The Auroras of Autumn"

[10] "The Auroras of Autumn" was written by this American poet, whose first collection, *Harmonium*, includes "The Snow Man" and "Anecdote of the Jar."

ANSWER: Wallace Stevens

[10] The speaker of this poem from *Harmonium* sees "the colors of the bushes" and the "fallen leaves" turning in the wind at night. It ends with the speaker saying "I felt afraid. And I remembered the cry of the peacocks."

ANSWER: "Domination of Black"

18. At one point in this piece, the mezzo-soprano is asked to sing into an amplified piano, and in its final vocalise, a boy soprano joins the mezzo-soprano on stage. For 10 points each:

[10] Identify this composition subtitled “A Cycle of Songs on Texts by Federico Garcia Lorca,” which is scored for toy piano and a musical saw, among other things.

ANSWER: **Ancient Voices of Children**

[10] *Ancient Voices of Children* is an experimental composition by this avant-garde American composer who also wrote the electric string quartet *Black Angels*.

ANSWER: George **Crumb**

[10] Another of Crumb’s works is this four-volume collection of piano works, the first two volumes of which are based on the signs of the zodiac. Its name alludes to a set of piano pieces by Bela Bartok.

ANSWER: **Makrokosmos**

19. Stanford psychologist Lewis Terman used this technique in his *Genetic Studies of Genius*, dubbing his subjects "Termites". For 10 points each:

[10] Identify this type of study which repeatedly examines subjects over a period of time.

ANSWER: **longitudinal** study [prompt on **observational** study]

[10] This study examined some 268 Harvard students for the next 75 years and compared traits like their financial success and rate of alcoholism to Boston inner-city youths tracked in the Gluek Study.

ANSWER: **Grant** Study

[10] The conventional form of this type longitudinal study works by identifying a study group and a control group prior to running a study and then comparing their results. A retrospective form of this type of study might use public records to find a group of people in 2010 who received a particular type of knee surgery and those who did not.

ANSWER: **cohort** study

20. In 2005, Goldston, Plintz and Yildirim showed that there are an infinite number of these things whose ratio is arbitrary small compared to the average ratio. For 10 points each:

[10] Identify these spaces between non-composite numbers.

ANSWER: bound **gaps** [or prime **gaps**]

[10] This mathematician, the subject of George Csicsery's documentary *Counting to Infinity*, proved that bound gaps were less than  $7 \cdot 10^7$  in a 2013 paper in *Annals of Mathematics*.

ANSWER: Yitang **Zhang**

[10] In the 1990s, Friedlander and Iwaniec proved that there were an infinite number of prime numbers in the form of  $a$  raised to this power plus  $b$  raised to this other power.

ANSWER:  $a^2 + b^4$  [or **squared** and **fourth** power; make sure order is correct]