

**Chicago Open 2013: No Subtext, Just Tacos**

**Packet by “If You Loved KABO, You’ll Love Our Packet” (Mike Cheyne, Kurtis Droge, Saajid Moya, Ashvin Srivatsa)**

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1. This task is related to, but distinct from, computing the Levenshtein distance, and one algorithm for doing it constructs a scoring matrix based on a gap-scoring scheme and then backtracks from the final cell to produce an output. That dynamic programming algorithm is the Smith-Waterman algorithm, which is a refinement of the earlier Needleman-Wunsch algorithm. When there are more than two inputs to this technique, the output is ideally stored in Stockholm format, though the simpler (\*) FASTA format is more commonly used. Gap-scoring schemes for doing this apply a penalty to indels, which correspond to frame shifts. One program used to perform this technique is ClustalW, and the output of this technique may be used to construct phylogenetic trees. For 10 points, name this technique in bioinformatics in which sequences of nucleotides or amino acids are arranged with respect to one another in such a way as to maximize locations at which the lists match. ANSWER: sequence alignment [or word forms; accept things like “aligning sequences of nucleotides” and so forth; accept just alignment after “sequences” is read]

2. This author created a young boy who wears a screwdriver on a necklace and makes one of his friends vomit by downing a whole tin of frog’s legs. In one of this author’s novels, peasant woman Amanda Woyke introduces the potato to Prussia, but its king steals all of her recipes and institutes serfdom. The narrator of another of his novels lets his friend die by withholding the can opener his friend needed to open his pork on a dive he took in the vicinity of an abandoned (\*) minesweeper. The former novel by this author is divided into nine “months,” corresponding to the narrator’s wife’s pregnancy with the “savior” Emanuel, and tells the stories of nine cooks from throughout history who testify before a Woman’s Tribunal. In the latter, this author created Pilenz, who worships his large-Adam’s-appled friend Joachim Mahlke. For 10 points, name this author of *The Flounder*, whose *Cat and Mouse* is part of his *Danzig Trilogy*. ANSWER: Gunter Grass

3. They are not by Rameau, but these works are the subject of a classic musicological study by Cuthbert Girdlestone. In two of these pieces, both in E-flat major, the rondo finale is unexpectedly interrupted by a slow minuet section. The second movement of one of these pieces quotes from the overture to Johann Christian Bach’s *La calamita de cuori* in response to that composer’s death. The slow movement of another of these pieces, an F-sharp minor siciliana, is the only movement the composer ever wrote in that key. A complete cycle of these pieces was recorded by Malcolm Bilson and (\*) John Eliot Gardiner, and in the ninth of these pieces the soloist interrupts the orchestra after only six beats. Only two of these pieces, the twentieth and twenty-fourth, are in minor keys. The composer never filled in the left hand of the solo part in the second-to-last of these pieces, which is nicknamed the “Coronation.” For 10 points, name this group of 27 pieces for soloist and orchestra that include ones nicknamed “Jeunehomme” and “Elvira Madigan.” ANSWER: piano concertos by Wolfgang Amadeus Mozart

4. The narrator of this story, possibly hallucinating, sees 3 or 4 drops of “ruby-colored fluid” drop into his wife’s wine out of thin air. The opium-addled narrator of this story purchases an English abbey containing a pentagonal bridal chamber with sarcophagi from Luxor at each of the five vertices. The title character of this story twice declares that “Man doth not yield himself to the angels...save only through the weakness of his feeble will,” a quote supposedly from (\*) Glanvill that also provides its epigraph. This story’s protagonist marries Lady Rowena Trevanion, who apparently dies of illness before coming back to life in the form of the title character, who had died soon after hearing a poem about a blood-red monster that devours humans in front of weeping angels. For 10 points, name this Edgar Allan Poe short story containing the poem “The Conqueror Worm.” ANSWER: “Ligeia”

5. In one story, this god discovers that his three sisters have been transformed into monsters after being stolen three hundred years ago by one of his arch-enemies. In that battle, this deity kills the fiendish Skipper Serpent, who is swallowed up by the Earth in order to produce a mountain range. He proclaimed “There is your place, remain there” from the top of a tree to an enemy who returns every year after shedding his skin. Some of this god’s oddest weapons include (\*) golden apples, which he throws in the air like explosives. He is symbolized by an eagle sitting on the top of the tallest branch of a sacred tree, while his arch enemy is the serpent-like god of the underworld, Veles. This deity rides in a chariot pulled by a goat buck and carries an axe that always returns to his hand. For 10 points, name this Slavic god of thunder and lightning.

ANSWER: Perun

6. A member of this sect, Gaudentius, reportedly threatened to burn down his church and his followers rather than surrender it. Extremists linked to it included peasants who would randomly beat travelers with clubs while screaming “Praise the Lord!” called “Circumcellions.” This sect condemned the actions of Mensurius, who tried to defend himself in a letter to Secundus. Its namesake and his beliefs were officially condemned at the first Council of (\*) Arles, which upheld the election of Caecilian. This sect was formed out of enmity towards *traditores*, Christians who had handed over Scriptures to the governor during Diocletian’s persecutions. Holding that sacraments administered by sinning bishops were invalid, it took its name from a Berber Christian bishop of Carthage. For 10 points, name this Christian sect formed out of a fourth and fifth century schism and located in North Africa.

ANSWER: Donatism

7. The speaker of this work claims he forgives his friend Atratinus, since he has “filial duty” as an excuse, and claims that some borrowed gold was not used to hire slaves to kill Dion the Alexandrian. An extended passage of this speech is a noted use of *prosopopeia*, as the speaker takes on the voice of the long-dead Appius Claudius Caecus if he “were to rise up right now.” Its speaker makes an accusation of incest by noting he has no ill-feeling toward the addressee’s “lover--I’m sorry, I meant to say ‘brother.’” This speech dismisses charges of poisoning and theft of gold by focusing on the accuser, a so-called “Medea of the Palatine” who was the basis for Catullus’ (\*) Lesbia. For 10 points, name this invective delivered by Cicero against Clodia, which is ostensibly a defense of the title Roman nobleman.

ANSWER: Pro Caelio [or On Behalf of Caelius; or In Defense of Claudius; prompt on In Clodium; prompt on Against Clodia]

8. In a Cyrano-esque scene in this opera, a woman admits to being the one who sent anonymous love letters to the title character; those two characters then pledge their love for each other in “Ora soave.” This opera opens with one character watching his father move furniture, which leads him to sing “Son sessant’anni” about the suffering of servants. Earlier, the spy Incredible sees through Bersi’s disguise as a revolutionary when he is following this opera’s title character. In a later scene from this opera, a character regrets making false accusations against the title character, but the (\*) Tribunal still imprisons him and orders him executed. Maddalena agrees to give herself to Gerard in order to save the title character in this opera’s most famous aria, “La mamma morta.” For 10 points, name this opera about a poet of the French Revolution, by Umberto Giordano.

ANSWER: Andrea Chenier

9. This actor played a character who is the subject of a YouTube video posted by “Notorious Swift” in which he interrupts playing *King Lear* to shout at an audience member with a cell phone. In one of this man’s movies, his character attacks a ceiling fan while attending a party dressed like Don Quixote. He ends one film role by looking in disgust at a fake commercial his character did for Dunkin’ Donuts in which he raps about his previous movies. In that role, this man gives his phone number on a hot dog to a disgusting-looking woman he sees at a Lakers game. He won a (\*) Razzie award for playing himself, the would-be lover of one of the title characters in the Adam Sandler comedy, *Jack and Jill*. For 10 points, name this actor who also won an Oscar for playing the blind Frank Slade in *Scent of a Woman*, and who may be best known for playing Michael Corleone in *The Godfather*.

ANSWER: Alfredo James “Al” Pacino

10. Octavius Hadfield worked to spread Christianity in this country, the site of a church whose name translates as “The Abode of the Absolute.” A scandal was caused in this country after every household received a copy of a document citing the Petone Incident as being caused by a lack of Christian values. This nation was the subject of the Mazengarb Report. Its social security system was dubbed “applied Christianity” by its most notable proponent, Michael Savage. Keith (\*) Holyoake served for over ten years as prime minister of this country, where the “King Movement” began. The pseudonym “Polly Plum” was used by feminists here, who helped make it the first country to grant women’s suffrage. After the Musket Wars, the British established control here via the Treaty of Waitangi. For 10 points, name this country, home to the Maori people.

ANSWER: New Zealand

11. A technique in this field was used in 1998 by Th. Renger and V. May to analyze the mechanics of exciton propagation in the Fenna-Matthews-Olson complex. This field studies a form of diffuse reflectance spectroscopy that is theoretically understood via the time-dependent Kubelka-Munk model. The temporal diffraction-difference method is used in a technique in this field that involves activating a relativistic electron gun. Early laboratories for conducting experiments in this field were called the “LANDs” of this field. Experimental apparatuses used in this field typically rely on the use of a mode-locked oscillator to generate bandwidth-limited pulses. A seminal experiment in this field studied the (\*) dissociation of cyanogen iodide and probed the transition state of that reaction. For 10 points, name this field of chemistry that uses techniques like pump-probe spectroscopy and ultrafast electron diffraction to study reactions on timescales of order “ten to the minus fifteen” seconds, for which Ahmed Zewail received the 1999 Nobel Prize in Chemistry.

ANSWER: femtochemistry [or word forms; or femtosecond spectroscopy]

12. Gale Cincotta led the fight against this practice in Chicago, thus popularizing this term coined by John McKnight. The experiences of Irvin Betts and Michael Lomax were described a series of articles on this phenomenon in Atlanta that won Bill Dedman a Pulitzer Prize. The *Underwriting Manual* of the FHA is often credited with promoting this practice due to the influence of Homer Hoyt. National People’s Action pressured the passage of the 1977 Community (\*) Reinvestment Act, which mitigated this practice. In *Crabgrass Frontier*, Kenneth Jackson blamed the “residential security maps” of the Home Owners’ Loan Corporation with advancing this practice. This practice gained its name from the color used to mark “Type D” neighborhoods considered risky for real estate investment. For 10 points, name this practice of denying services based on neighborhood of residence, often in areas with many people of color.

ANSWER: Redlining

13. A foolish character in this location is unable to answer the riddle, “Who builds stronger than a mason, a shipwright, or a carpenter?” A soldier in this place begs his listeners to pile up dirt until they make “a mountain...to overtop old Pelion,” which another character one-ups by asking that the mountain “make Ossa like a wart.” The protagonist exits this location immediately after predicting that “the (\*) cat will mew but dog will have his day.” Earlier in this place, that character argues that Alexander the Great’s “noble dust” may have served “to stop a beer-barrel.” A scene in this location begins as two clowns argue over whether a woman who drowned herself is damned as a suicide; in that scene set in this place, the protagonist leaps into a pit to confront his dead girlfriend’s brother after crying, “It is I, Hamlet the Dane.” For 10 points, name this setting of Act V, Scene I of *Hamlet*, in which Hamlet cries, “Alas, poor Yorick!” after picking up the jester’s skull.

ANSWER: the graveyard from Act V, Scene I of *Hamlet* [prompt on Elsinore; prompt on Denmark]

14. Monads are structures in the space of these objects that were used to construct all instantons in almost all gauge groups in the ADHM construction. One transform important to the theory of these objects is analogous to the Radon transform. That transform utilizes the natural correspondence represented by the double fibration of a compactified, complexified Minkowski space and a space of these objects such as  $CP^3$  [C P 3], the complex projective 3-space. The Fourier transformation of the perturbative scattering in Yang-Mills theory from momentum space to the space of these objects was suggested by (\*) Witten in 2003. A transform involving these objects is named for Penrose, who originated the study of these objects in 1967 as a possible method of understanding quantum gravity. The creation of a namesake type of string theory revitalized the study of, for 10 points, what objects, which are essentially commuting spinors?

ANSWER: twistors

15. In one painting by this artist, a king on horseback wearing a laurel wreath is about to trample the snake heads of a winged demon as that king undergoes apotheosis. In another of his paintings, an angry-looking, shirtless Indian king is carried in front of a warlord on a white horse. This head of the Gobelins manufactory made a tapestry of his painting that showed two Persian queens groveling before the title character and Hephaestion. This artist's series on *The History of (\*) Alexander* includes *Alexander and Porus* and *The Tent of Darius*, which earned him the post of Chief Painter to the King. He depicted his patron riding a white horse in between two members of his suite flanking him with parasols in *Chancellor Seguier on Horseback*. The woman who painted *Self-Portrait in a Straw Hat* was married to this artist's distant relative. For 10 points, name this seventeenth century French painter who decorated the salons of Peace and War, as well as the ceiling of the Hall of Mirrors at Versailles.

ANSWER: Charles Le Brun

16. Quentin Skinner claims to have found a 17<sup>th</sup>-century “neo-Roman” version of this concept. Gerald MacCallum critiqued an essay on this concept by arguing that it was a “triadic relation” between terms he denoted x, y, and z. Benjamin Constant contrasted the Ancients’ view of this concept with its perception by the Moderns. A noted essay on this concept argues that a man who decides to train himself to cut off his wounded leg rather than healing it exemplifies a “retreat to the (\*) inner citadel” and warns that treating this concept as “self-mastery” may lead to the “Temple of Sarastro.” Charlemagne and Akbar are held up as examples of necessary despots in a different essay on this concept, which was divided into “positive” and “negative” forms by Isaiah Berlin. For 10 points, name this concept, the subject of a John Stuart Mill essay outlining the “harm principle.”

ANSWER: liberty [or freedom, since the distinction is too vague to rule that out]

17. After this battle, the winning commander wrote a letter praising his troops’ “persevering intrepidity in action, their invincible patience in hardships and fatigues of march.” During it, one hero killed eleven men, including one who wounded him in the thigh with a bayonet; that hero was the “Virginia Giant,” Peter Francisco. Shortly before this battle, Henry Lee defeated Dr. John Pyle’s forces in “Pyle’s Massacre” by posing as Banastre Tarleton, an incident that hurt British morale during it. After this battle, (\*) Charles James Fox groaned “Another such victory would ruin the British Army!”, even though the British won. The losing commander *here* quickly ordered a retreat to avoid another Battle of Camden. For 10 points, name this March 15, 1781 battle, a pyrrhic victory for Lord Cornwallis over Nathanael Greene near Greensboro, North Carolina.

ANSWER: Battle of Guilford Court House

18. This author repeats the refrain “Not there, not there, my child” in a poem where “beyond the clouds, and beyond the tomb” is revealed to be the location of “The Better Land.” This poet asks the “Crown’d of Rome” “art thou not / Happy in that glorious lot?” in a poem that compares its title character to “She that makes the humblest hearth / Lovely but to one on earth.” This author of “Corinne at the Capitol” asked for “hearts of native proof [to] be rear’d / To guard each hallow’d wall” in a poem that was parodied by adding the word (\*) “Stately” to its title by Noel Coward. In this woman’s best-known poem, “the noblest thing that perished” on board a ship “Was that young faithful heart,” a boy who calls out to his dead father while standing at his post “on the burning deck;” that poem concerns the explosion of the *Orient* during the Battle of the Nile. For 10 points, name this 19th-century female poet of “The Homes of England” and “Casabianca.”

ANSWER: Felicia Hemans

19. Wedge-shaped arcus cloud formations often indicate the forming of these convective systems and demarcate their outflow boundaries. Eleven years after one of these hit Iowa in 1877, Gustavus Hinrichs published a paper in which he coined this term. Their winds are the products of convective downdrafts called downbursts which are about 5 miles wide and can last for several minutes; within downbursts are smaller but more violent structures called microbursts or burst swaths. They are classified into two main types: (\*) serial ones produced by multiple bow echos may be hundreds of miles wide and regularly produce tornadoes, while progressive ones are narrower and may consist of only a single bow echo but travel much further. For 10 points, name this succession of straight-line wind storms that stretches more than 240 miles with winds at least 58 mph and often occurs yearly in the Midwest.

ANSWER: derechos

20. During Subotai's siege of this city, its defenders used iron chains to lower a devastating explosive called the "heaven-shaking thunder-crash bomb" into the enemy's trenches. A device in this city made use of a "celestial ladder," the first known chain-drive mechanism, that powered its armillary sphere; that was the astronomical (\*) clock tower designed here by Su Song. Its cultural landmarks include an octagonal-based pagoda named for the color of its glazed bricks, the Iron Pagoda. This city was sacked in the Jingkang Incident, in which emperors Qinzong and Huizong were both abducted, forcing the capital to move to Lin'an while this city became the southern capital of the Jin. For 10 points, name this city that served as a capital of the Northern Song dynasty and still contains a small population of Chinese Jews.

ANSWER: Kaifeng [or Dongjing; or Bianjing]

21. This island gets much of its power from the amusingly named "Terror Lake Hydroelectric Generating Station," which is located within a wildlife refuge. This island contains a place called "Refuge Rock" where possibly thousands of the Alutiq people were massacred in 1784. Much of its animal life was wiped out after the 1912 Novarupta volcanic eruption. In July 2012, Pitbull visited this island's Walmart after it won a Facebook campaign. Separated from the mainland by the (\*) Shelikof Strait, it is home to the Karluk River and its famous salmon run, as well as a large namesake type of bear. This island's village of Old Harbor was destroyed in the 1964 Good Friday Earthquake. For 10 points, name this second largest island in the United States, located on the south coast of Alaska.

ANSWER: Kodiak Island

1. The so-called “statistical approach” to synthesizing these complexes involves performing a ring-closing reaction and hoping that some of the rings will interlock. For 10 points each:

[10] Name these complexes of linked molecules in which two or more macrocycles are interlocked. The pretzelanes are one family of these complexes.

ANSWER: catenanes

[10] With a structure similar to that of catenanes, these macrocyclic molecules are composed of repeating units of glycoluril linked by methylene bridges. They are ring-like structures composed of 5-membered and 8-membered rings and their funny name is derived from a family of pumpkins.

ANSWER: cucurbituril

[10] In host-guest chemistry, these molecules are often seen bound by pi-stacking interactions to buckycatchers. They are hollow spheres, ellipsoids, or tubes composed entirely of carbon atoms.

ANSWER: fullerenes

2. This author won the Pulitzer Prize for *Live or Die*, which contained poems like “And One for My Dame.” For 10 points each:

[10] Name this poet of collections like *To Bedlam and Partway Back* and *The Awful Rowing Toward God*.

ANSWER: Anne Sexton

[10] This Anne Sexton poem from *To Bedlam and Partway Back* opens, “I have gone out, a possessed witch.” It is divided into three stanzas comparing the speaker to a witch, a crazy woman in a cave, and a woman persecuted for religion.

ANSWER: “Her Kind” [according to Wikipedia, also the name of Anne Sexton’s jazz-rock group]

[10] This fellow Confessional poet wrote “Beyond the Alps” in *Life Studies*, which includes a poem about creatures “that search in the moonlight for a bite to eat” titled “Skunk Hour.”

ANSWER: Robert Lowell IV

3. Time for everyone’s favorite bonus topic: French taxes! For 10 points each:

[10] The *gabelle* was a highly unpopular tax on this commodity. English towns that end in “wich” supposedly were sites of the production of this commodity that also was the subject of a protest march led by Gandhi.

ANSWER: salt

[10] This term refers to labor that must be provided as a form of taxation to those in power, especially feudal lords. Often used in road construction, it was abolished after the French Revolution.

ANSWER: corvee labor

[10] Exemptions from the *taille* are frequently mentioned in these lists of complaints about royal administration drawn up by the three estates before the gathering of the Estates-General. Many of them have survived and serve as important records of the unrest before the Revolution.

ANSWER: cahiers de doléances

4. This piece begins with an octave G-sharp in the left hand that is held for two bars, and throughout most of this piece's outer sections the pianist must play four-against-three rhythms. For 10 points each:

[10] Name this posthumously published piece for solo piano in C-sharp minor.

ANSWER: Fantaisie-Improptu

[10] The *Fantaisie-Improptu* was written by this Polish composer and pianist who wrote numerous polonaises, mazurkas, and waltzes, and also wrote etudes nicknamed “Black Key” and “Revolutionary.”

ANSWER: Frédéric Chopin

[10] The lyrical middle section of the *Fantaisie-Improptu* is in this key, which he also used for his *Berceuse*, the “Raindrop” Prelude, and the middle section of his famous Funeral March.

ANSWER: D-flat major

5. The Buryat shamans of southern Siberia worship this god, who is usually married to Eje. For 10 points each:

[10] Name this god of the blue sky also worshipped by Turkic peoples. It is believed that the confidantes of Genghis Khan also worshipped this god, but it's hard to tell since the Mongols were so religiously tolerant.

ANSWER: **Tengri** [or **Tenger** Etseg]

[10] This integer is sacred to Tengri. This integer, which is so important to Kyrgyz folklore that the word "Kyrgyz" literally refers to this many tribes of people, is also the number of days that Jesus spent wandering in the desert.

ANSWER: **forty**

[10] These charms, used by Turks to ward off the evil eye, are thought to have emerged from a Tengriist tradition. They are typically blue with concentric white and blue dots painted on them.

ANSWER: **nazar** *boncuğu*

6. South African literature, for 10 points each:

[10] This woman described the Hunter's Allegory and created the awesomely-named villain Bonaparte Blenkins in a novel published in 1883, *The Story of an African Farm*.

ANSWER: Olive **Schreiner**

[10] Rosa struggles with the legacy of her Communist father in this woman's novel *Burger's Daughter*.

ANSWER: Nadine **Gordimer**

[10] Olive Schreiner and Nadine Gordimer were both white. The first English novel written by a black South African was this "Epic of South African Life" by the inimitable Sol Plaatje.

ANSWER: **Mhudi**

7. In phonology, this theoretical framework has largely supplanted rule-based models. For 10 points each:

[10] Name this linguistic theory developed by Prince and Smolensky, which uses systems of ranked "constraints" to determine how underlying representations become output words.

ANSWER: **optimality** theory [or **OT**]

[10] This connectionist formalism in syntax differs from optimality theory in that it weighs constraints rather than ranking them. Unlike OT, this model predicts gradations in acceptability judgments among speakers.

ANSWER: **Harmonic grammar** [or **HG**]

[10] This language's unaccusative verbs were analyzed in the 1990 paper that introduced harmonic grammar. Recent innovations in this language include word-rearranging slang called *verlan* and the omission of the particle *ne* from negation sentences, though *pas* (PAH) still remains.

ANSWER: **French** [or **français**]

8. This empire grabbed part of the Shandong Peninsula from China by leveraging the murder of two of its missionaries by the Big Sword Society in the Juye Incident. For 10 points each:

[10] Name this powerful European empire that started colonizing during the late 19th-century Scramble for Africa, but still had plenty of time to commit the Herero Genocide and provoke the Agadir Crisis.

ANSWER: **Germany** [or the **German Empire**; or **Deutschland**]

[10] The Herero Genocide was largely the handiwork of this German commander, who drove the Herero into the desert after the Battle of Waterberg, poisoned their water, and encircled the desert with his soldiers so that they could not escape.

ANSWER: Lothar **von Trotha**

[10] Karl Peters' forced labor policies provoked the Maji Maji Rebellion in German East Africa. The Maji Maji Rebellion takes its name from the magic medicine worn by its participants, which its leader claimed would do *this* to German bullets.

ANSWER: **turn** them into **water** [prompt on **stopping** them; prompt on **deflecting them**; prompt on **destroying** them]

9. This process is believed to be the primary mechanism by means of which the Earth's atmosphere was formed. For 10 points each:

[10] Name this process, in which atmospheric components are released from a liquid melt. Volcanic eruptions in the early Earth are believed to have played a major role in this process.

ANSWER: outgassing

[10] The pre-outgassing atmosphere of the Earth would have mostly been lost via this mechanism, since it consisted mostly of light gases that have a heavy Maxwell-Boltzmann tail. This mechanism is less important on Titan, since Titan is cooler than the early Earth was.

ANSWER: Jeans escape [or thermal escape; accept hydrodynamic escape]

[10] Observation of zircons suggests that the Earth was actually relatively cool prior to this violent period of time during which many of the Moon's craters formed. One hypothesis suggests that a now-destroyed planet "V" triggered this period when its orbit near the asteroid belt was destabilized.

ANSWER: Late Heavy Bombardment [or LHB]

10. The final thesis presented in this work is that "the differences between the well-known English writers on [the title discipline] from Sidgwick to the present day are of little importance." For 10 points each:

[10] Name this essay, which suggests that the title discipline should be set aside until a sufficient grounding in philosophy of psychology is established. It originated the term "consequentialism."

ANSWER: "Modern Moral Philosophy"

[10] "Modern Moral Philosophy" was written by G.E.M. Anscombe, who translated this Wittgenstein book into English. It argues against the possibility of a private language through the "beetle-in-a-box" argument.

ANSWER: Philosophical Investigations

[10] Consequentialism contrasts with this rule-based form of ethics exemplified by Immanuel Kant's categorical imperative. It holds that people should act according to means-restricting norms, not just for the optimal end.

ANSWER: deontological ethics [or deontology]

11. This author wrote a novel in seven sections about the heroin addict Mark Renton, whose other characters have nicknames such as "Spud" and "Sick Boy." For 10 points each:

[10] Name this author of *Porno* who wrote about a bunch of Scottish druggies in his film-adapted book *Trainspotting*.

ANSWER: Irvine Welsh

[10] Sherlock Holmes injects himself with cocaine at the beginning of this story, whose title refers to the agreement made between the peg-legged Jonathan Small and his three Sikh criminal associates.

ANSWER: *The Sign of Four* [or *The Sign of the Four*]

[10] This American novel, written in the second person, concerns a fact-checker at a high-profile magazine who deals with his abandonment by his wife Amanda by doing cocaine at nightclubs.

ANSWER: Bright Lights, Big City

12. This artist designed the San Cataldo Cemetery as well as the newest version of the Carlo Felice Theater. For 10 points each:

[10] Name this architect of the Bonnefanten Museum in Maastricht and the Quartier Schutzenstrasse in Berlin.

ANSWER: Aldo Rossi

[10] This British architect of "the Gherkin" in London made the design for the 1990's reconstruction of the Berlin Reichstag.

ANSWER: Norman Foster

[10] Johann Gottfried Schadow designed one of these sculptures to top the Brandenburg Gate in Berlin. Venice's Horses of Saint Mark's form one of these sculptures, defined as a chariot drawn by four horses.

ANSWER: a quadriga



13. Technologies of this type use the properties of a known guide star or small laser-guide to determine how to deform a mirror. For 10 points each:

[10] Name this class of technologies that is used in ground-based telescopes to dynamically correct for aberration due to the Earth's atmosphere.

ANSWER: **adaptive optics** [prompt on "optics"]

[10] Adaptive optics is necessary because the turbulence in the atmosphere results in this quantity varying based on position, causing effects such as the twinkling of the stars. This quantity is given by the ratio of the speed of light in a vacuum to the speed of light in the medium.

ANSWER: **index of refraction** [accept **refractive index**; prompt on "n"]

[10] One issue with adaptive optics systems is that they make this function time-dependent. This function describes the response of the system to the light emitted by a small source object, and is often modeled to first order as an Airy disk.

ANSWER: **point spread** function [or **PSF**]

14. Marshall Steinbaum will be happy to know this is not a history bonus. For 10 points each:

[10] Lucius Junius Brutus ousted the Roman monarchy after Lucretia was raped by this son of Rome's last king.

ANSWER: **Sextus Tarquinius** [prompt on **Sextus**; prompt on **Tarquin**; do not accept or prompt on "Tarquinius Superbus" or "Tarquin the Proud"]

[10] Those wacky early Romans killed particularly onerous murderers and traitors by throwing them from this steep cliff of the Capitoline Hill. Its name references a traitorous Vestal Virgin.

ANSWER: **Tarpeian** Rock [or *Rupes* **Tarpeia**]

[10] Another king of Rome, Numa Pompilius, married this nymph, who gave him prophetic advice on ruling the city. She turned into a spring after Numa's death.

ANSWER: **Egeria**

15. This artist's oil works include a series of portraits of the insane, including *The Woman with Gambling Mania*, *The Madwoman*, and *Portrait of a Kleptomaniac*. For 10 points each:

[10] Name this French painter of three versions of a *Wounded Cuirassier* and a study titled *Anatomical Pieces*.

ANSWER: Theodore **Gericault**

[10] In this Theodore Gericault painting, four jockeys urge on their horses, which impossibly have all four of their legs extended in mid-air.

ANSWER: *The* **Derby at Epsom** [or *The* **Epsom Derby**; or rough equivalents]

[10] This earlier French Romantic painter was more classically-inclined. A friend of Piranesi, this repetitively-named artist enjoyed painting Roman ruins, as well as contemporary buildings like the Louvre crumbling like Roman ruins. He thereby earned his epithet, "of Ruins."

ANSWER: Hubert **Robert**

16. These people's traditional homes are called "hogans." For 10 points each:

[10] Name this Southwestern American Indian tribe mostly located in Arizona and New Mexico. Some members of this tribe served as "Code Talkers" during World War II.

ANSWER: **Navajo** people [or **Dine** people]

[10] In 1864, the Navajo people were forced at gunpoint in this event to move to eastern New Mexico at the Bosque Redondo internment camp. Hundreds of Navajos died during this event.

ANSWER: The **Long Walk**

[10] This Navajo chief decided to take 4,000 of his people and wage guerrilla war against the Americans rather than confine himself to Bosque Redondo. Though he eventually turned himself in, he also signed the treaty that got the Navajo out of reservations.

ANSWER: Chief **Manuelito**

17. This man is an emeritus professor at the University of Wisconsin, where he continues to write “Dear Colleague” letters outlining his philosophy. For 10 points each:

[10] Name this Chinese-American geographer and pioneer in the field of humanistic geography. His best known book is *Space and Place: The Perspective of Experience*.

ANSWER: Yi-Fu **Tuan**

[10] A much earlier example of human geography involved John Snow creating an 1854 map tracing outbreaks of this disease in London.

ANSWER: **cholera**

[10] In “The Geographical Pivot of History,” Halford John Mackinder used this term to denote the geopolitically crucial region at the center of the “World-Island,” which a power can control by dominating Eastern Europe.

ANSWER: the **Heartland**

18. Can you keep the Time of Troubles straight? For 10 points each:

[10] During the Time, several folks claimed to be this dude, the youngest son of Ivan the Terrible. One of them even became tsar himself.

ANSWER: **Dmitriy** Ivanovich [or **Demetrius**, or anything with **Dmitri** in it]

[10] After the murder of the First False Dmitriy, this man became tsar. Never really recognized, he was the only member of his house to serve as tsar and he was deposed in 1610.

ANSWER: **Vasili** IV of Russia [or **Vasily** Shuyskiy]

[10] During the Time of Troubles, the Polish-Lithuanian Commonwealth carried out some invasions, many led by this bloodthirsty light cavalry unit, who supported the second false Dmitry and defended Smolensk in 1612.

ANSWER: The **Lisowczycy** [or **Straceny** or **Lisowczyk** or **clear**]

19. It undergoes a conformational change after binding to sigma factor 70 to form its namesake holoenzyme, and its C-terminal domain contains numerous heptapeptide repeats that play a role in recruitment of the spliceosome, for 10 points each:

[10] Name this enzyme that synthesizes messenger RNA from a DNA template. Unlike similar enzymes in its class, it is strongly inhibited by alpha-amanitin.

ANSWER: **RNA polymerase II**

[10] In prokaryotes, the sigma factor of the RNA polymerase II holoenzyme binds to the minus-35 element, while RNA polymerase II recognizes and binds to this six-nucleotide consensus sequence located five to ten nucleotides upstream of the transcription initiation site.

ANSWER: **Pribnow Box** [accept: **Thymine-Adenine-Thymine-Adenine-Adenine-Thymine**]

[10] This transcription factor’s binding to the promoter region creates a kink in the DNA that allows for recruitment of the remainder of the preinitiation complex. Found in eukaryotes, it is composed of thirteen TAFs for promoter selectivity as well as the TATA binding protein.

ANSWER: **T**ranscription **F**actor **II-D**

20. Description acceptable. This character has a stroke after Doctor Cottard tells her to take a walk in the sun and sit under a laurel grove, noting that the laurel is a symbol of Apollo. For 10 points each:

[10] Name this friend of the Marquise de Villeparisis, whose sisters refuse to visit her as she lies dying of illness for ten days and forty pages at the end of the first section of *The Guermantes’ Way*.

ANSWER: Marcel’s **grandmother** [or Bathilde **Amedee**; or **Bathilde** Amedee]

[10] This friend of Marcel visits his grandmother on her deathbed, but ignores Marcel to spite him over a quarrel. This aristocratic nephew of Madame de Guermantes enters an unhappy marriage with Gilberte Swann and dies in World War I.

ANSWER: Robert de **Saint-Loup** [or **Robert** de Saint-Loup]

[10] Saint-Loup, Marcel, and Marcel’s grandmother all appear in this seven-volume novel by Marcel Proust.

ANSWER: **In Search of Lost Time** [or **Remembrance of Things Past**; or **A la Recherche du Temps Perdu**]

21. The first experimental confirmation of gravitational lensing involved a double image of one of these bodies. For 10 points each:

[10] Name this type of active galactic nucleus. They are usually radio-quiet and characterized by excess emissions in both the UV and the IR.

ANSWER: quasars

[10] This body is the brightest quasar in the sky. During its occultation by the moon in 1962, it was found to be receding at a significant fraction of the speed of light, providing early evidence that quasars were extremely distant.

ANSWER: 3C 273

[10] 3C 273 contains one of these structures, which extends about 20 arcseconds away from its center. The unified theory of AGNs posits that the major differences we see in different AGNs are a function of the angle at which we view these structures, which are typically emitted orthogonal to an accretion disk.

ANSWER: relativistic jets

22. In one scene in this work, a character sings “Never Give All the Heart” as she quotes William Butler Yeats. For 10 points each:

[10] Name this fictional musical about the life of Marilyn Monroe. The lead role is played by Ivy Lynn, an actress played by Megan Hilty.

ANSWER: Bombshell [prompt on Marilyn: The Musical, prompt on Smash]

[10] *Bombshell* is a fictional musical which appears on the NBC show *Smash*, a program that stars Debra Messing. Messing previously appeared with Eric McCormack and Sean Hayes on this NBC comedy as one half of the title platonic couple.

ANSWER: Will and Grace

[10] This actress played Rebecca Duvall, the original star of *Bombshell*. In another role, she played a former member of the Deadly Viper Assassination Squad named Beatrix Kiddo.

ANSWER: Uma Thurman

## Unused Questions

Costanzo Beschi wrote an epic poem in this language about the life of St. Joseph; that poem's title translates as "The Unfading Garland". Another epic written in this language begins by describing the way in which the golden feet of a certain dancing deity ought to be adored, and is about a set of 63 adherents of that deity. The term "suya mariyathai", which appeared in works in this language like the *Thirukkural*, prefigured the Self-Respect Movement among writers in this language, including Periyar. In one work in this language, Matavi lives a happy life with her husband Kovalan while the main character, Kannagi, mourns the death of her husband; that work is the *Silappatikaram*, and is one of the five Great Epics of this language. The Nayanars are the subject of the *Periya Puranam* in this language, which was written by Sekkizhar ("seh-kee-yaar"), a writer in the employ of Kulothunga II. Murugan is glorified in the Sangam literature of this language, much of which was written in Pandiya. In a 13<sup>th</sup>-century work written in this language, a demon king uproots a cottage to abduct a woman, instead of carrying the woman off by her hair; that work is the *Kambaramayanam*. Either Kannada or this language is presumably spoken in the town of Malgudi, the setting of many of R.K. Narayan's stories. For 10 points, name this language whose modern writers include Ashokamitran and Sujatha, a Dravidian language of India and Sri Lanka.

ANSWER: **Tamil**

The reconstruction problem for these things may be approached by using a learning algorithm that incorporates a multiplicity automaton and is efficient when their partial derivatives span a low-dimensional space. A 2013 paper showed that these things exhibit a "chasm" at depth three, indicating that for exponentially-sized ones, ones deeper than "sigma-pi-sigma" ones do not yield asymptotic improvements. Another result of that paper was that the determinant of a d-by-d matrix could be computed using one of these of size "two to the big-O of log d times square root d", and these things have been used to show that over general fields, the permanent is harder to compute than the determinant. A seminal result by Valiant is that  $VNC^2$ , the class of these things with log-squared depth, is equivalent to VP, which is the analogue of P for algebraic structures like these objects. The Schwartz-Zippel algorithm is a randomized algorithm for determining whether one of these is identically zero. These objects can be represented by algebraic branching programs at the cost of an exponential increase in size. Formally, these things are directed acyclic graphs over a field, equipped with a set of variables and two operations, and they are called formulas if the graph is actually a directed tree. When analyzing these things, one attempts to understand a specific representation of a function, unlike in Boolean circuits, which are a subset of these things. For 10 points, name these circuits that are the standard model for computing polynomials.

ANSWER: **arithmetic** circuits [prompt on "circuits"]

When a set is equipped with one of these relations, it is possible to define a topology that is generated by the subbasis consisting of open rays. A group equipped with one of these relations is said to be translation-invariant. In a lattice equipped with one of these relations, join and meet map onto max and min, and the lattice is called distributive. The subjects of Zorn's lemma are sets in which every subset with one of these relations has an upper bound in the set. If a set lacks one of these relations, but a subset of it has one of these relations, that subset is called a chain. These binary relations must be transitive and asymmetric, and for a relation "star", either "a star b" or "b star a" must be true for all "a" and "b" in the set on which the relation acts. That last property gives these relations their name. A set must be equipped with one of these relations to be well-ordered, as the natural numbers are. For 10 points, name these binary relations that make all elements of a set comparable; that are stronger than partial orders; and examples of which include "greater than or equal to".

ANSWER: **total orders** [or **linear orders**; or **simple orders**; accept **non-strict orders**; accept "ordering" instead of "order" in any of those; accept any of those without the word "order" after it is read; prompt on "orders"]

In this work, a page asks a servant whether two characters will be a match – the servant says to ask his dog and if he says yes, says no, or wags his tail, it will be a match. That dog, Crab, belongs to Launce, who convinces the page to buy him a drink after this exchange. One character in this work receives a letter from her maid, Lucetta, which she tears up, but she later tries to reassemble the pieces of the letter and kisses them, as they are from her beloved; that female gives a ring to her beloved and goes to Milan where she disguises herself as a page named Sebastian and is commanded to re-gift that ring to another woman. One of the central characters loves a woman who is locked in a tower and is to be wed to Thurio, and this love causes him to be banished and accepted into a band of outlaws. When that man vows to defend Silvia to the death against Thurio, the Duke accepts his love and allows Silvia to marry

him. In the end, Julia also receives a vow of faithfulness from her beloved. For 10 points, name this Shakespearean comedy about Proteus and Valentine.

ANSWER: The **Two Gentlemen of Verona**

This story's protagonist concludes that he does not want immortality while on his deathbed, instead dreaming of a herd of incredibly beautiful deer. For 10 points each:

[10] Name this story about a doctor who does not realize that a meeting he is called to attend is actually being held to question his sanity. He later becomes a patient at the asylum he once tended over.

ANSWER: "**Ward No. Six**"

[10] "Ward No. Six" was written by this author whose other short stories include "The Lady with the Dog" and "The Black Monk."

ANSWER: Anton **Chekhov**

[10] In this Chekhov story, Shamohin relates his obsession with the titular girl to the narrator while on a boatride to Sevastopol. Shamohin cannot help but love her even though he finds her repulsive, partly due to his own jealousy.

ANSWER: "**Ariadne**"

The title character of this play becomes upset when her husband buys Victor's sheep, which helps to push Victor to move away. For 10 points each:

[10] Name this play in Garcia Lorca's "Rural Trilogy" in which the title character is unable to have children and murders her husband Juan.

ANSWER: **Yerma**

[10] This other Garcia Lorca play in which Don Christobita wields the title weapon in his efforts to force Rosita to marry him, despite Rosita's love for Cocoliche.

ANSWER: The **Billy-Club Puppets** [or *Lose **Titeres de Cachiporra***]

[10] Garcia Lorca also wrote a play about an eighteen year old "Prodigious Wife" of a man with this profession. In an English play, Rowland Lacy disguises himself as a man named Hans with this profession.

ANSWER: **shoemaker**

An apocryphal story claims this ruler died from the heat of a pan of hot charcoal because the proper official to take it away was not around. He is not an Irish king, but his naval forces were unsuccessful in a battle against the English at Kinsale. After this man's wife, Margaret, died during childbirth, Rodrigo Calderon was accused of bewitching her. He became the heir to the throne after the death of his insane, older brother, who himself was the subject of a Verdi opera and Schiller play. Shortly after he took the throne, he made the Duke of Lerma his most trusted adviser. This man issued a decree expelling the Moriscos from his country and to support his cousin, Ferdinand of Bohemia, he brought his country into the Thirty Years War. For 10 points, name this king of Spain who succeeded his father, the Hapsburg Philip II.

ANSWER: **Philip III** [or **Philip II of Portugal**, or **Philip the Pious**]

The losing side in this battle was led by Lord Maxwell and Oliver Sinclair, who found themselves pinned to the River Esk. For 10 points each:

[10] Name this British victory over a much larger Scottish force loyal to James V, who died two weeks afterwards.

ANSWER: Battle of **Solway Moss**

[10] Solway Moss is sometimes included at the beginning of this conflict, in which Henry VIII tried to enforce the terms of the Treaty of Greenwich by having his son Edward VI wed Mary, Queen of Scots.

ANSWER: War of the **Rough Wooing**

[10] One phase of the Rough Wooing was sparked by the murder of the Scottish cardinal David Beaton, which spelled trouble for this clergyman who would later found Presbyterianism and led the reformation of Scotland.

ANSWER: John **Knox**

The current head of this church is Peter Gilmore. For 10 points each:

[10] Name this church founded on April 30, 1966, on Walpurgisnacht. Its scripture is heavily inspired by the writings of Aleister Crowley, and Gilmore stresses this church is more about questioning faith and less about belief in a Devil.

ANSWER: **Church of Satan**

[10] This man, known as the “Black Pope,” was the founder of the Church of Satan. He is the author of *The Satanic Bible* and *The Devil’s Notebook*.

ANSWER: Anton Szandor **LaVey**

[10] The official insignia of the Church of Satan contains an image of this pagan deity, usually represented as a “Sabbatic Goat” raising one arm up and the other down.

ANSWER: **Baphomet**