Scobol Solo 2021
Packet 9 (Round 9)

1. Fermat's [fair-mah'z] method for finding these values treats each odd number as the difference of two squares, whereas Euler's [OY-lur'z] method takes advantage of even numbers that can be expressed as the sum of squares two different ways. The fastest way to find these values is usually a quadratic sieve or a general number-field sieve. The fundamental theorem of arithmetic states that there is a unique way to find these values in terms of primes for every integer larger than 1. The Euclidean [yook-LID-ee-en] algorithm finds the greatest of these that two numbers have in common. A prime number has only two positive examples of these values, 1 and the prime number itself. Give this term for a number that evenly goes into another number.

   Answer: (positive or prime) <u>factor</u>s or <u>divisor</u>s

2. In a novel by this writer, John Cavendish says "It's a jolly good life taking it all round—if it weren't for that fellow Alfred Inglethorp!". In that novel by this writer, John was the stepson of Emily, who married Alfred during World War I even though he was much younger than her. In another novel by this writer, one of the characters is surprised to find a red kimono in his luggage. That passenger is helped by Monsieur Bouc [book] to get onto a train whose passengers include Samuel Ratchett. Name this writer whose *The Mysterious Affair at Styles* introduced the Belgian detective Hercule Poirot [air-kyool pwah-roh], who also solved this author's *Murder on the Orient Express.*

   Answer: Agatha (Mary Clarissa) <u>Christie</u>

3. When this person narrated his story to Stephen Melvil Barrett, he claimed to have killed a general who had just said "Exterminate this band at any cost." This person's mother, first wife, and three children were killed in an attack by José Maria Carrasco. This person said "This is the fourth time I have surrendered" when he surrendered to Nelson Miles in 1886. This person eventually made money by performing in Pawnee Bill's Wild West, and crowds cheered him during President Theodore Roosevelt's inaugural parade. Name this Apache fighter.

   Answer: <u>Geronimo</u> [or <u>Goyahkla</u>]

4. This desert contains the Tecopa and El Pakiva caves, which combine to form the Mitchell Caverns in the Providence Mountains. Those mountains are near the Cronese Mountains, which are part of this desert's Devils Playground. This desert used to receive some water from the overflow of Owens Lake, which is near the town of Lone Pine. Near the south end of this desert, Parker Dam forms Lake Havasu [HAH-vuh-soo]. This desert is between the Great Basin and Sonoran Deserts. Name this desert that is mostly in California but also contains Las Vegas.

   Answer: <u>Mojave</u> [moh-HAH-vay] Desert

5. When these materials have the same substance they have the same elements of symmetry, according to the law of constancy of symmetry. These materials are also described by the law of axial ratio and Steno's [STAY-noh'z] law, which is also called the law of constancy of inter·facial angles. These materials can be classified as primitive, base-centered, body-centered, and face-entered, which are examples of Bravais [brah-vay] lattices. Name these solids that have a highly ordered structure at the atomic or molecular level.

Answer: crystals [or crystalline solids; prompt on solids]

Check the score.

6. In a play by this writer, a man describes getting in a fight with his old cat because she no longer liked him, after which the man took the cat to the vet and had her killed. This person wrote that play about Agnes, Tobias, and several people who show up to live at their house. Another play by this writer begins with two men determining that one of them has been walking north but not due north. This writer set much of that play on a park bench in Central Park. Name this writer of *A Delicate Balance* who described a fight between Peter and Jerry in *The Zoo Story*.

Answer: Edward (Franklin) Albee (III)

7. This person said "I have my wife to love and Windthorst [VINT-horst] to hate", and a failed meeting with Windthorst ended this person's career. This person was replaced by Leo von Caprivi. In a famous speech, this person said "The great questions of the time will not be resolved by speeches and majority decisions." This leader supported Minister of Education Adalbert Falk, who put the government in charge of education and whose May Laws restricted the power of the Catholic Church as part of the *Kulturkampf* [KOOL-toor-kahmpf]. Name this minister-president of Prussia and chancellor of the German Empire who united Germany.

Answer: Otto von Bismarck(-Schönhausen)

8. The artist of this painting is now credited with painting the background of a similar work, though that similar work is set outside and portrays its subject asleep, in contrast to this painting. The night·time sky can be seen in the background of this painting through an opening that has a column in it. This painting is similar to a painting credited to Giorgione [jor-JOH-nah] and to Édouard Manet's [ayd-war man-ay'z] *Olympia*, though this painting has two women in the background. Name this work showing a naked woman lying on a bed, a painting by Titian [TISH-un].

Answer: *Venus of Urbino* [accept *Reclining Venus*]
(The Giorgione painting is *Sleeping Venus*.)

9. Sartaj Sahni and Teofilo Gonzalez showed that if there is a polynomial-time heuristic [hyur-ISS-tik] for this problem that meets a specific bound, then $P = NP$. Brute-forcing this problem takes factorial time, but it can be done in $2^n n^2$ ["2 to the n times n squared"] time by the Held-Karp algorithm. The obvious greedy algorithm for this problem is called the nearest neighbor algorithm. In terms of graph theory, this NP-hard problem is to find a Hamiltonian cycle with the smallest possible weight. Name this problem of finding an optimal route for a person who goes from city to city.

Answer: <u>traveling salesman</u> problem [accept <u>traveling salesperson</u> problem]

10. This world leader was criticized for the lack of action against Jonathan Vance, the Chief of the Defence Staff who retired in 2021 after being accused of sexual misconduct. China's arrests of Michael Spavor [SPAY-vur] and Michael Kovrig [KAWV-rig] may have been an attempt to pressure this leader to release Cathy Meng. This person's job was targeted by Jagmeet Singh, Yves-François Blanchet [eev fran-swah blawn-shay], and Erin O'Toole in 2021. This leader got in several recent spats with Joe Biden because of border restrictions. Name this prime minister of Canada.

Answer: Justin (Pierre James) <u>Trudeau</u> [do not accept or prompt on "Pierre Trudeau"]

Check the score.

11. This person was allowed to end his exile by Shapour Bakhtiar [shah-PUR BAK-tee-ar], who was later murdered in a Paris suburb not far from where this person ended his exile. This person's return from exile is celebrated annually as the Fajr [FAH-jur] decade. Most of this person's exile was spent in Najaf [nuh-JAHF], Iraq. This person claimed that the failure of Operation Eagle Claw was an act of God. This religious figure became a ruler when a revolution overthrew Mohammad Reza Pahlavi, who had been the Shah. This person supported people who took Americans hostage in his country. Name this Supreme Leader of Iran from 1979 to 1989.

Answer: (Ayatollah Sayyid) Ruhollah <u>Khomeini</u>

12. One piece by this composer begins with a half-note chord with two C's followed by the notes between those C's being a dotted quarter B, eighth F sharp, quarter notes A, G, F, D, and a half-note C. This composer's fourth symphony premiered in 1833 and begins with an *Allegro vivace [vee-VAH-chay]* in A major in which the strings quickly repeat chords. The fourth and final movement of that symphony is an A-minor *Saltarello [sahl-tah-RAY-loh]*. That symphony, like this composer's third, was named for his travels. Name this composer of the Scottish and Italian Symphonies who also wrote a very popular "Wedding March".

Answer: (Jakob Ludwig) Felix <u>Mendelssohn</u>(-Bartholdy)

13. This law explains why di·boron tri·oxide or germanium di·oxide is useful as a cladding with glass. This law became known when it was published in Christiaan Huygens' ["HI"-gunz'] book *Dioptrica*, but it is named for another Dutch scientist. This law is consistent with Huygens' principle that each point on a wavefront is a source of new waves. This law is also equivalent to Fermat's [fair-mah'z] principle of least time. This law allows a calculation of the critical angle for total internal reflection. Name this law that states that the ratio of the sines of two angles equals the ratio of the wave speeds in two media, which also equals the ratio of the indices of refraction.

Answer: <u>Snell</u>'s law [accept the <u>Snell</u>–Descartes law; prompt on law of <u>refraction</u>]

14. This daughter of Abihail thwarted an assassination plot by Bigthan and Teresh. When this woman's parents died, she was raised by her father's nephew. This person eventually stated "For we are sold—I and my people—to be destroyed, to be slain, and to perish", which led to a man being hanged at a gallows that the man had prepared for someone else. This woman replaced Queen Vashti as the husband of King Ahasuerus [ah-HAHZ-yoo-AIR-uss] and then stopped a plot by Haman to kill Mordecai and all Jews. Identify this hero of Purim who is the namesake of a book in the Hebrew Bible and the Christian Old Testament.

Answer: <u>Esther</u> [accept <u>Hadassah</u>]

15. Some of the policies in this law were based on ideas from a commission created by the Aldrich–Vreeland Act. 20 years after this law passed, one of its authors strengthened it by allowing the structures created in this law to oversee holding companies in the Glass–Steagall Act. The goals of this law have changed over time, and they are now officially "maximum employment, stable prices, and moderate long-term interest rates". Name this 1913 act that created our current central banking system, which is overseen by a chair and 12 regional banks.

Answer: <u>Federal Reserve</u> Act

Check the score.

16. In one novel by this writer, Dr. Omayra Torres claims to want to vaccinate people but she actually wants to inject the measles virus in them. This author wrote that novel about Alex Cold, who uses his grandfather's flute to attract the People of the Mist and restart the Fountain of Eternal Youth. Another novel by this author begins with the arrival of a dog named Barrabás that is later turned into a rug when it dies on the night of an engagement party for Clara and Esteban. That novel is about the Del Valle ["VIE"-ay] and Trueba [troo-AY-bah] families. Name this author of *City of the Beasts* and *The House of the Spirits.*

Answer: Isabel <u>Allende</u> (Llona)

17. A character in this musical sings the line "Now that I'm 19 / I'll do something incredible / that blows God's freaking mind" in the song "You and Me (But Mostly Me)". At the beginning of this musical, Kevin Price hopes to go to Orlando, but instead he and Arnold Cunningham are sent to Uganda, where they make up stories combining science fiction and religion. Name this musical, first staged in 2011, that was written by Robert Lopez, Trey Parker, and Matt Stone and also includes the songs "Joseph Smith, American Moses" and "Tomorrow Is a Latter Day".

Answer: *The Book of Mormon*

18. This process has traditionally been classified as epi·morphosis or morph·allaxis. While blastemas [blas-TEE-muhz] are usually found in embryos, some organisms are good at this process because they can create blastemas throughout their lifecycle. Because of the uni·potency of hepatocytes [heh-PAT-oh-"sites"], the liver is better at undergoing this process than other large organs in adult humans. Hydras are good at this process because they have a high proportion of stem cells. Salamanders and newts can undergo this process for a missing tail or limb. Name this process that, unlike the growth of scar tissue, essentially reverses a bodily injury.

Answer: regeneration or regenerating body parts [prompt on healing]

19. Karl Popper addressed the problem of this concept by arguing that science is more concerned with falsifiability and demarcation than this concept. The so-called "problem of" this concept was originally stated by David Hume and is based on the un·provability of the Uniformity Principle. Tests of this type of reasoning measure how well somebody can work with unfamiliar information to find a pattern. This type of reasoning is equivalent to generalizing from empirical evidence. Name this type of reasoning that leads to conclusions that are probable, in contrast to deductive reasoning.

Answer: induction [accept inductive reasoning]

20. A William Cullen Bryant poem addressed to one of these objects states "Thy peerless beauty yet shall fade." One of these objects narrates a Percy Bysshe [bish] Shelley poem that states "I change, but I cannot die" and ends "Like a child from the womb, like a ghost from the tomb, I arise and unbuild it again." In another poem, the writer compares himself to one of these objects "that floats on high over vales and hills". In that poem, the narrator "saw a crowd, a host, of golden daffodils". Name this object that William Wordsworth wandered "lonely as".

Answer: clouds
(Bryant's poem is "To a Cloud", Shelley's is "The Cloud", and Wordsworth's is "I Wandered Lonely as a Cloud".)

This is the end of regulation. Check the score. If it is tied, proceed to overtime tossups. If it is not tied, the game is over.

TB21. At about the same time that Andrew Wiles used elliptic curves to prove Fermat's [fair-mah'z] Last Theorem, Neal Koblitz and Victor Miller showed that this field of math could benefit by taking advantage of the elliptic curve discrete logarithm problem. That work was used to improve this field of math's Diffie–Hellman scheme. The result is a method that requires less information than a method based on the multiplication of two very large prime numbers, which arose from work in this field by Ron Rivest, Adi Shamir, and Leonard Adleman and is thus named the RSA algorithm. Name this field that has developed public-key methods used to transmit information securely.

Answer: <u>cryptography</u> [accept <u>cryptology</u> or <u>encryption</u> or <u>decryption</u> or <u>cryptanalysis</u>]

If the score is still tied, continue. If it is not tied, the game is over.

TB22. In one book by this writer, a slave is taught how to find twice the area of a square, which leads to arguments about whether the soul is immortal and whether somebody can be taught something new. The slave belongs to this writer's title character Meno [MEE-noh]. In another book by this writer, there is an allegory about people who are only able to see the blank wall of a cave. That allegory is described just after this person wrote about the analogies of the sun and of the divided line. Name this writer of *The Republic* whose books generally consist of dialogues involving this person's teacher, Socrates.

Answer: <u>Plato</u> [or <u>Platon</u>]

If the score is still tied, continue. If it is not tied, the game is over.

TB23. This letter is often used to represent Young's modulus. This letter also often represents a charge that is about 1.6×10^{-19} ["1 point 6 times 10 to the negative-19th"] coulombs [KOO-lohmbz]. This letter is the most common letter in the English language. This letter is also used to express an irrational number that is approximately 2.718 and is the base of natural logarithms. Name this letter that is between 'D' and 'F'.

Answer: <u>e</u>

There are no more overtime questions available. If the score is still tied, contact the control room for further instructions. If it is not tied, the game is over.