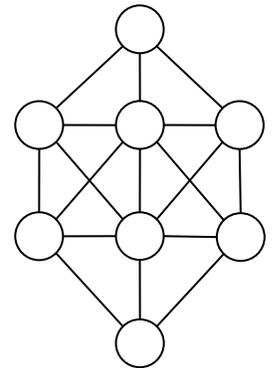


Partial submission due today, final submission due Wed.

Solve these problems. Do not use calculators.

- (1) Fill in the circles in the diagram to the right with the digits 1 through 8 (one digit in each circle with none repeated) so that no two circles that are connected by a line segment contain consecutive digits. If you think it is impossible, then explain why.



- (2) Given the points a , b , and c shown below, plot ab , bc , ac , b^2 , c^2 , \sqrt{a} , and \sqrt{c} .



- (3) In a drawer, there is two pairs each of white, black, brown, red and blue socks that are all unmatched and scattered about. What is the least amount of socks that must be pulled from the drawer to *guarantee* that you have a matching pair?
- (4) A magician has three coins in her pocket. One is a standard coin, one is a double-headed coin, and one is a double-tailed coin. She reaches into her pocket, pulls out a coin and flips it. It shows tails. What are the chances that it is the double-tailed coin?
- (5) Select a number. Add 5, and then double the result. Then divide this result by 2 and subtract the original number. Do this for several different numbers to see if you notice a pattern.
- a. Make a generalization (inductive reasoning).
 - b. Prove your generalization (deductive reasoning).
- (6) An explorer intends to hire porters for her attempt to walk from village Alpha to village Beta, across vast desert. It is a 6-day walk, and each person can carry no more than enough food and water for 4 days in the desert. Food and water cannot be shared, but porters can pass off to other members of the expedition (which is the point of hiring porters). Porters do not need to walk the entire journey, but they must have enough food and water to get back to the village they started from
Is it possible for the expedition to succeed? If so, what is the minimum number of porters and rations needed?

Circle T for True, or F for False. In either case, justify your response.

- (7) When two numbers are added, the result is larger than both of the original numbers. T F

Justification:

- (8) The sum of two negative numbers is also negative. T F

Justification:

- (9) The square root of a number is smaller than the number itself. T F

Justification:

- (10) If we take 50% off and then 20% off of that, it's the same as taking 70% off in the first place. T F

Justification:

- (11) Two computers are available to run a very complicated program. The first, Arnetik, can complete the program in 6 hours. The second, Betakin, can do it in only 4 hours. If the two computers are networked and the program is run together on the computers, how long will it take?

- (12) A passenger gets into a taxi cab and tells the driver the following directions, for some integer n .

Go straight $n - 1$ blocks and then turn right. Follow that for $2n - 7$ blocks and then make another right. Continue for $n - 3$ blocks. Then, turn left and go n blocks. At that point, go right and proceed for $n + 1$ blocks and make another right. Finally, go $2n - 3$ blocks, turn right, and go $n - 1$ blocks.

Without going anywhere, the cabbie told the passenger to get out because that route begins and ends at the same place. But, he continued, the cost would have been \$5.50 if he'd have followed the route. If there are 11 blocks per mile, how much does the cab service charge per mile?

- (13) When a certain football team scores, its mascot fires a rifle once for each point of the team's total score at the time. For example, after two touchdowns and a field goal, the mascot will have fired her rifle $7 + 14 + 17 = 38$ times in total. In a particular game, if all of the football team's scores are either 7 or 3 point and the mascot fires her rifle a total of 71 times, how many points did it score in that game?