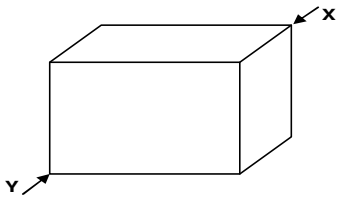
Statistics

1. Andrea Miguel is a fun traveler in New York City from Guatemala and she decided to hit the Canal Street Subway Station in the morning and hop into the first train that comes in. There are southbound trains every 30 minutes with the first train at 5:10am (i.e., 5:10, 5:40, 6:10, 6:40, 7:10 and so on). There are northbound trains every 20 minutes with the first train at 4:15am (i.e., 4:15, 4:35, 4:55, 5:15, 5:35 and so on). Andrea wakes up around 8am and she hits the subway randomly anytime after getting ready and having her breakfast. What is the probability of Andrea going towards north?
2. From a deck of 52 cards, you take out 2 cards sequentially. If you don't look at the first, then what is the probability the 2nd card is diamond?
3. Suppose you're on the game show similar to Monty Hall, the American television game show Let's Make a Deal. You're given the choice of 4 doors; behind one door is the prize. You pick a door, then the host, who knows what's behind each door, opens another door that is empty. He then says to you, "Do you want to switch your pick?" Is it to your advantage to switch your choice?

Math

1. An ant that is in the corner of a room Y, would like to walk up to other corner of the room X. Which is the shortest way for the ant to walk up to other corner of the room?
2. How can 3 be less than 2?
   $\frac{1}{8} < \frac{1}{4}$
   $(\frac{1}{2})^3 < (\frac{1}{2})^2$
   $\text{Log } (\frac{1}{2})^3 < \text{Log } (\frac{1}{2})^2$
   $3 \text{ Log } (\frac{1}{2}) < 2 \text{ Log } (\frac{1}{2})$
   $3 < 2$



3. How can 2 be equal to 1?

Say x + y = z	add x+y on both side
2x+2y = x+y+z	then subtract 2z on both side
2x+2y-2z = x+y-z	which is 2(x+y-z) = 1(x+y-z)
cancel (x+y-z)	gives you 2=1

4. Design 2 dices such that when you roll and sum them, it can be any number between 1 and 36.
5. How would you sum up the below series of numbers.
   $2^0, 2^1, 2^2, 2^3, 2^4, 2^5, 2^6, \ldots, 2^n$

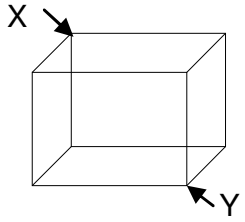
Finance

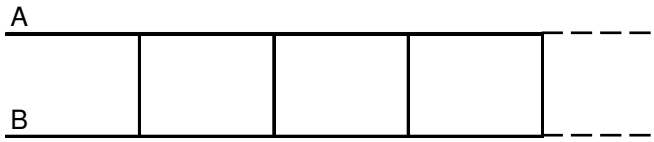
1. Which would have higher premium between a call and a put? If both call and put are at the money?
2. If the stock split 2 for 1, how would it impact the calculation of asian option pricing?
3. Is it possible to have a swap contract with different notional value for float and fixed side, if so what are the challenges faced.
4. Why bonds are quoted in clean/flat price and settled in dirty/full/invoice price and what is the rationale behind it?
5. Four bonds are trading at 23, 24, 25, 26. All of them are going to mature in 4 days and you have the market information that 3 out of 4 would be bankrupt for sure. Now what are your options?
6. American options are traded most of the time and not executed until the maturity, then why buy American option? We can buy European option itself.
7. What is the Duration of the bond and how would you derive Macaulay Duration? Which has a higher duration – 5% or 6% bond?
8. What is Sharpe Ratio and what does it mean in the CAPM model context?

Physics

1. Two trains are at a distance of 150 miles from each other and there is a bird on one of the train. Both the trains started traveling towards each other at speed 35 miles per hour and 40 miles per hour. At the same time the bird started traveling at the speed of 45 miles per hour towards the 2nd train, upon bumping the 2nd train the bird bounces and travels back to 1st train at the same speed. The bird continues series of bouncing between both the trains until both the train crashes. Now calculate the total distance traveled by the bird before the train crash.

2. The pressure and volume in a balloon is very low to start with, when you start inflating it both pressure and volume start building up and finally the balloon pops out. How come this is violating the Boyle's law, pressure * volume = constant.
3. This cube is made of 12 wires/resistances of 5 ohms each. What is the total resistance between points X & Y.





4. Calculate the total resistance between point A & B of infinitely connected wire/resistances. Each vertical line has a resistance of 12 ohms and each horizontal line has a resistance of 1 ohms.

Computers

1. Design a simple program that would output next prime number given one prime number as input.
2. Given a char ASCII value how can you find what it is?
3. Given just a CPU and 2 register how would you swap 2 integers. Similarly how would you swap 2 bit or string?
4. A set of numbers is arranged in ascending order, how would you order them in descending using minimum number of basic operations.
5. Design a simple sorting algorithm considering the big "O" notation cost of operation.

Analytical

1. You have 15 pound of wheat and you have to pack in minimum number of packages, so that you can make any combination of whole pound (ie. 1, 2, 3, 4,….14,15 pounds) of wheat?
2. You have 3 boxes which contain red, green and red&green balls. The boxes are marked incorrectly red, green and red&green. When you picked one ball from box marked red you found red ball, now can you guess which box contain which ball?

Java/C++

1. What would be the output of the following line of code?
   a=7; b=21; a=b++; print (a, b);
2. Why C++ does not have a finally block for exception handling?

SQL

1. A database table has lots of duplicate records, how would you just delete the dup records.
2. The real-time market prices of equities are being stored in a database table for every tick. How would you retrieve latest price of equity and sort then in descending order?

Miscellaneous

1. Most retail stores sell goods at fixed price whereas most automobile dealers negotiate on price all day. Why not everyone follow the same strategies to maximize profits.
2. Name two states in USA that share a common word with its capital.
3. You are at a dealer table with 13 people, each have a heart card and you have 13 diamond cards with you. The dealer would offer $100 for each pair of heart and diamond. In this scenario how can you make the most out of it?
4. On a summer day the air condition machine broke down at my home, and then I decided to keep the refrigerator open to keep my home cool. How effective would this be?
5. You have been working all day Friday to generate a report for board meeting. Then you realized that you had used stale data as input and the report is no good. Now how would you like to handle this situation?