11th Grade Assignment – Week #20

Announcement: Next week's assignment will include a test on *Possibility & Probability*

Group Assignment: *For Tuesday or Thursday*

Carefully choose problems from **Problem Set #4** and the **Challenge Problem Set** (*Possibility & Probability – Part II* unit) to work on together. The rest of the problems you can save for individual work.

Individual Work

- Study for next week's test on *Possibility & Probability.*
- Work on problems from **Problem Set #4** and the **Challenge Problem Set**, focusing on the problems that you aren't doing in your group.

— Possibility & Probability– Part II —

Problem Set #4

1) In how many ways can the letters of the word…
   a) SPECIAL be rearranged?
   b) LILLIPUT be rearranged?

2) How many 3-letter words can be made from the letters of the word PREVIOUS if…
   a) letters cannot be repeated?
   b) letters can be repeated?

3) In how many ways can a student select 4 toppings for a pizza if there are 12 options?

4) 3 boys and 3 girls are to stand in a line. How many arrangements are there…
   a) altogether?
   b) with boys and girls in alternating positions?
   c) with the 3 girls standing next to one another?

5) In a class of 20 students…
   a) how many ways can 4 students be selected to go on a field trip?
   b) how many possible ways are there to select 4 of the students and place them in a line?

6) Twelve points are such that no three points are collinear. How many triangles can be formed using three of the twelve points as corners?

7) There are 16 marbles, identical in every way except color. 5 are blue, 6 are red, 3 are green and 2 are black. How many ways are there to put all 16 marbles in a row?

8) There are 6 history books and 10 novels. How many ways can we select…
   a) 2 history books and 3 novels?
   b) 5 books if at least one is a history book?

9) Three dice are rolled. What is the probability that…
   a) all 3 dice will be the same?
   b) the total will be 6?
   c) the total will be 6 or all three dice will be the same?

10) Use Pascal's triangle to expand…
   a) $(x+y)^7$
   b) $(x-2)^7$

11) In flipping seven coins, what is the probability of…
   a) getting exactly 3 heads.
   b) getting more than 4 heads.
   c) getting fewer than 3 heads.

12) Suppose 18 people are going to be randomly divided up into 2 baseball teams of 9 people each. What is the probability that all 9 of the best players will be on the same team?

13) You and two friends are at a restaurant. There are 10 meals on the menu. How many ways are there to…
   a) choose one meal for each person?
   b) choose 3 different meals for the 3 of you?
   c) choose 3 different meals which are all to be shared?

Challenge Problem Set

1) On a multiple choice test with 7 questions, each with possible answers ABCD:
   a) With random guessing, what is the probability of getting exactly 4 correct answers?
   b) What is the probability of getting at least 4 correct answers?

2) With a 13-card bridge hand, what is the probability of getting…
   a) no queens?
   b) exactly one queen?
   c) exactly two queens?
   d) exactly three queens?
   e) all four queens?
   f) at least one queen?
   g) at least two queens?

3) A standard lockbox has ten buttons, each one labeled with a digit. The code can be any number of digits (repeats aren't allowed). The order in which the buttons are pushed doesn't matter (e.g., 456 is the same code as 645). How many possible codes are there…
   a) in total?
   b) that have either three digits or four digits?

4) With a five-card poker hand, what is the probability of getting…
   a) exactly 3 aces?
   b) three cards of one kind (but the other two are not a pair)?
   c) only black cards?
   d) a full-house (i.e., three-of-a-kind and one pair)?

5) Birthday questions.
   a) Out of a group of 10 people, what is the probability that at least 2 people have the same birthday?
   b) How large of a group is needed so that there is at least a 50% probability that at least 2 people will have the same birthday?

6) With a 13-card hand, what is the probability of getting…
   a) no hearts?
   b) at least one heart?
   c) exactly 4 hearts?
   d) only honor cards (i.e., Jack through Ace)?
   e) four cards of one kind?

7) With a five-card poker hand, what is the probability of getting…
   a) the queen of spades?
   b) exactly 2 hearts and 2 diamonds?
   c) three or more hearts?
   d) a void in at least one suit (i.e., cards from 3 or fewer suits)?

8) Three groups of four!
   a) How many ways are there to divide a class of 12 into three groups of four?
   b) A class of 12 is divided randomly into three groups of four. Find the probability that Betty and Sue end up in the same group.
   c) In how many ways can 12 (different) gifts be distributed to 3 children if each is to receive 4 gifts?