ADDITIONAL COUNTING PRACTICE PROBLEMS MA 110

Answers

1. Find the number of seven-digit telephone numbers that have at least one repeated digit. (a) If leading 0's are allowed. (b) If leading 0's are not allowed. *(a) [10^7 – 604,800 = 9,395,200]*
(b) [$9x10^6$ – 544,320 = 8,455,680]

2. a. How many different 7-letter words (real or imaginary) can be formed from the letters in the word NUMBERS? *[7! = 5,040]*
b. How many different 6-letter words (real or imaginary) can be formed from the letters in the word FINITE? (Hint. How does Part b differ from Part a?) *[(6x5x4x3x2x1)/(2x1)=360] The letter "I" is repeated.*

4. A single man wants to invite at most 2 of his 4 friends to dinner on Sunday so he won't eat alone. In how many ways can he do this? *[4 + (4x3)/2] = 10*

5. An urn contains 15 red balls and 10 white balls. Five balls are selected, one at a time. In how many ways can the 5 balls be drawn (assuming the order of the draw matters) *[All are possible since there are sufficient balls in the urn of each color.]*
   (a) If all balls are red? *[1]*
   (b) If 3 balls are red and 2 are white? *[10]*
   (c) If at least 4 are red balls? *[6]*

6. How many batting orders of length 9 for a baseball team are possible from a roster of 20 players? *[20x19x18x17x16x15x14x13x12=6,094,932480]*

7. An employment agency has listed 5 highly skilled workers. Find in how many ways 2 of these workers can be selected:
   (a) If the first one is to be a foreman and the second one is to be a helper. *[5x4=20]*
   (b) If they are simply to be sent to do a job. *[(5x4)/(2x1)=10]*

8. A television network has 6 different half-hour programs during prime time (7 P.M. to 10 P.M.) If you want to watch 3 programs in one evening:
   (a) How many choices do you have? *[(6x5x4)/(3x2x1)=20]*
   (b) If exactly one of the programs must be after 9 p.m., how many choices do you have? *[2x(4x3)/(2x1)=12]*

9. The playbook for the quarterback of the Dallas Cowboys contains 50 plays.
   (a) In how many ways could the quarterback select 3 plays to use in succession in the next 3 downs? *[50x49x48=117,600]*
   (b) In how many ways could he select a set of 3 plays to study? *[(50x49x48)/(3x2x1)=19,600]*

10. A student must take 3 different courses on Mondays. In how many ways can the student do this:
   (a) If there are 6 different courses, all available at each of the 3 hours 8 A.M., 9 A.M., and 10 A.M.? *[6x5x4=120]*
   (b) If only 1 of these courses is available each hour between 8 A.M. and 2 P.M. (6 hours)? *[(6x5x4)/(3x2x1)=20]*

11. On a certain day, the Wilton County Jail has 130 prisoners accused of felonies, 121 prisoners were

accused of misdemeanors, and 61 prisoners were accused of both a felony and a misdemeanor. How many prisoners were in the Wilton County Jail that day? *[130 + 121 – 61 = 190]*

12. A survey of 1000 subscribers to the *Los Angeles Times* revealed that 900 people subscribe to the daily Morning edition and 500 subscribe to both the daily and the Sunday editions. How many subscribe to the Sunday edition? How many subscribe to the Sunday edition only?

Let x denote the number who subscribe to the Sunday edition. Then the addition rule with overlap tells us that
900 + x – 500 = 1,000
400 + x = 1,000
x = 600
Hence, 600 subscribe to the Sunday edition and 600 – 500 =100 subscribe to the Sunday edition only.