Week # 11 NFM2106/NFE2105

1. A man chooses at random an integer between 1 and 100 inclusive. What is the probability of each of the following events:
   (a) Number chosen > 30.
   (b) One of the factors of the chosen number is 11.
2. In the experiment of throwing a dice twice, what is the probability of each of the following events?
   (a) 6 comes up at least once.
   (b) Total score is 5.
   (c) Total score ≤ 4.
   (d) Total score > 4.
   (e) The two scores are equal.
   (f) The second score is higher than the first.
3. A box contains 8 working light bulbs and 3 that do not work. A man chooses 4 bulbs at random from the box. What is probability that the 4 he chooses include exactly 3 that work?
4. A box contains five 10 ohm resistors and twelve 30 ohm resistors. The resistors are all unmarked and of the same physical size.
   (a) If one resistor is picked out at random, determine the probability of its resistance being 10 ohms.
   (b) If the first resistor is found to be 10 ohms and it is retained on one side, find the probability that a second selected resistor will be of resistance 30 ohms.
5. A box contains 100 copper plugs, 27 of which are oversize and 16 undersize. A plug is taken from the box, tested and replaced; a second plug is then similarly treated. Determine the probability that:
   (a) both plugs are acceptable;
   (b) the first is oversize and the second undersize;
   (c) one is oversize and the other undersize.
6. Two keys that will open a door get mixed up with 8 that will not. From the 10, a man selects keys one by one without replacement and tries them until he finds one that opens the door. What is the probability that this happens with the third key he selects (i.e., the first 2 keys do not open the door and the third does)?

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7. It is known that, on average, three-quarters of seeds from a certain source germinate when planted. If someone plants 8 of the seeds, what are

   (a) the probability that exactly 6 of the 8 germinate?

   (b) the probability that at least 6 of the 8 germinate?

8. It is known that in a certain large population one-third of the people are left-handed. If 5 people are chosen at random from the population, what is the probability that exactly 2 of them are left-handed?

9. A thermostat set to switch at 20° C operates at a range of temperatures *normally distributed* having a mean of 20.4° C and a standard deviation of 1.3° C. Determine the probability of its opening at a temperature between 19.5° C and 20.5° C.

10. The life of a drill bit has a mean of 16 hours and a standard deviation of 2.6 hours. Assuming a *normal distribution*, determine the probability of a sample bit lasting for:

    (a) more than 20 hours;

    (b) fewer than 14 hours.

11. The masses of 800 people are *normally distributed*, having a mean value of 64.7 Kg and a standard deviation of 5.4 Kg. Find how many people are likely to have masses less than 54.4 Kg.

12. In an experiment to determine the relationship between frequency (X) and the inductive reactance (Y) of an electrical circuit, the following results were obtained

X (Hz) :	50	100	150	200	250	300	350
Y (ohms) :	30	65	90	130	150	190	200

    Determine the equation of the regression line of inductive reactance on frequency, assuming a linear relationship. What is likely to be the inductive reactance of a circuit if the frequency is 175 Hz?

13. The experimental values relating centripetal force (Y) and radius (X), for a mass travelling at constant velocity in a circle, are as shown:

X (cm) :	55	30	16	12	11	9	7	5
Y (N) :	5	10	15	20	25	30	35	40

    Determine the equation of the regression line of force on radius. Hence, calculate the force at a radius of 40 cm.

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ANSWERS:

1. (a) $\frac{7}{10}$; (b) $\frac{9}{100}$.
2. (a) $\frac{11}{36}$; (b) $\frac{1}{9}$; (c) $\frac{1}{6}$; (d) $\frac{5}{6}$; (e) $\frac{1}{6}$; (f) $\frac{5}{12}$.
3. $\frac{28}{55}$.
4. (a) $\frac{5}{17}$; (b) $\frac{15}{68}$.
5. (a) 32.5%; (b) 4.3%; (c) 8.6%.
6. $\frac{7}{45}$.
7. (a) 31.1%; (b) 68%.
8. 0.329.
9. 28.7%.
10. (a) 6.2%; (b) 22.1%.
11. 28.1%.
12. $Y = 0.586X + 4.94$; $Y = 107.5$ when $X = 175$.
13. $Y = -0.617X + 33.7$.

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