NORMAL DISTRIBUTION
1. For a standard normal distribution, determine
   a) $P(z < 2.43)$  
   b) $P(1.87 \leq z < 2.73)$  
   c) $P(z \geq 2.75)$  
   d) $P(-0.53 \leq z < -2.03)$  
   e) $P(z \geq 1.98)$  
   f) $P(-1.82 \leq z \leq 1.82)$

2. Find the area under the normal curve between
   a) $z = 1.23$ and $z = 2.48$
   b) $z = -1.20$ and $z = -2.40$
   c) $z = -1.20$ and $z = 2.40$

3. Find the area under the normal curve and
   a) to the left of $z = -1.78$
   b) to the left of $z = 0.96$
   c) to the right of $z = -1.43$
   d) to the right of $z = 2.13$
   e) between $z = -2.20$ and $z = 1.15$

4. Let $X$ be normally distributed with mean 8 and standard deviation 4. Find
   a) $P(5 \leq X \leq 10)$  
   b) $P(10 \leq X \leq 15)$  
   c) $P(X \geq 15)$  
   d) $P(X \leq 5)$

5. Given a continuous random variable $X$ which is normally distributed with mean 240 and standard deviation 20. Determine
   a) $P(216 \leq X \leq 252)$  
   b) $P(X \leq 256)$  
   c) $P(224 \leq X \leq 238)$  
   d) $P(X \geq 215)$

6. Find the value of $z$ such that the area
   a) to the right of $z$ is 0.2266
   b) to the left of $z$ is 0.0314
   c) between -0.23 and $z$ is 0.5722
   d) between 1.16 and $z$ is 0.0730
   e) between $-z$ and $z$ is 0.9000

7. If $X$ is a continuous random variable having standard normal distribution. Find the values of $z_1$, $z_2$, $z_3$ and $z_4$ such that
   a) $P(0 \leq X \leq z_1) = 0.4306$
   b) $P(X \geq z_2) = 0.7704$
   c) $P(X > z_3) = 0.2912$
   d) $P(-z_4 \leq X \leq z_4) = 0.9700$

8. Find the mean and standard deviation for an examination in which grades of 70 and 88 correspond to standard scores of -0.6 and 1.4, respectively.

9. The weights of new born babies at a particular hospital have been observed to be normally distributed with mean 5.5 kg and standard deviation 0.5 kg. If a baby is selected at random, what is the probability that, his/her weight is
   a) greater than or equal to 7 kg?
   b) less than 5 kg?

10. Suppose the exam results of course at a college are normally distributed with mean 55 and standard deviation 5. If a student is selected at random, what is the probability that the student’s mark is,
    a) less than 50.
    b) between 53 and 58.
    c) greater than or equal to 75.

11. If the diameters of balls produced by a factory are normally distributed with mean 6.14 cm and standard deviation 0.03 cm. Determine the percentage of balls with diameters,
    a) between 6.10 and 6.18 cm.
    b) greater than or equal to 6.17 cm.
    c) less than 6.08 cm.

12. The annual income of workers in a state is normally distributed with mean 15000$ and standard deviation 2000$. If a worker is chosen at random, what is the probability that the worker earns
    a) more than 16000$?
    b) less than 12000$?
    c) between 10000$ and 20000$?

13. Suppose the exam results (out of 300) of 2000 students are normally distributed with mean 155 and standard deviation 20. Find the number of students whose exam results are,
    a) less than 100.
    b) between 120 and 130.
    c) between 150 and 175.
    d) greater than or equal to 200.
14. Suppose the daily average temperatures in June are approximately normally distributed with mean 30 °C and standard deviation 3 °C.
   a) If a day is considered at random, what is the probability that, the temperature at that day is between 27.5 °C and 33.0 °C?
   b) How many days are there in June, having the daily average temperature between 27.5 °C and 33.0 °C?

15. If the weights of 300 students are normally distributed with mean 66 kg and standard deviation 3 kg. How many students have weights, a) greater than or equal to 70 kg? b) less than 62 kg? c) between 63 and 69 kg?

16. In a photographic process, the developing time of prints may be looked upon as a random variable having the normal distribution with mean 15.40 seconds and standard deviation 0.48 seconds. Find the probabilities of the time it takes to develop one of the prints will be a) at least 16.00 seconds. b) at most 14.20 seconds. c) anywhere from 15.00 to 15.80 seconds.

17. A random variable $X$ has a continuous random variable with the standard deviation; $\sigma = 10$. If $P(X < 82.5) = 0.8212$, find $P(X > 58.3)$.

18. The mean grade of the marks of a course is 72 and the standard deviation is 9. If top 10% of the students will get grade 'A', what is the minimum mark in order to get grade 'A'?

19. The mean grade of the marks of a course is 66 and the standard deviation is 10.
   a) If top 15% of the students will get grade 'A', determine the minimum mark in order to get grade 'A'.
   b) If bottom 10% of the students will get grade 'F', determine the minimum mark in order to pass. (not getting grade 'F')
   c) If 20% of the students around the mean will get grade 'C', determine the interval in order to get grade 'C'.

NORMAL APPROXIMATION TO THE BINOMIAL DISTRIBUTION

20. A fair coin is tossed 10 times. Find the probability of obtaining between 4 and 7 heads (both inclusive), by using the a) binomial distribution. b) normal approximation to the binomial distribution.

21. Use normal approximation to the binomial distribution to determine the probability of getting 7 heads and 7 tails in 14 tosses of a fair coin. Also find the error of this approximation.

22. Find the probability that 200 tosses of a fair coin will result the number of heads, a) between 80 and 120, both included. b) greater than 75 and less than 85. c) greater than or equal 75 and less than 85. d) greater than 75 and less than or equal to 85. e) less than 90. f) less than or equal to 90. g) greater than 100. h) greater than or equal to 100. i) less than 85 or more than 115. j) equals 100.

23. A fair die is tossed 720 times. Find the probability that '6' will occur, a) between 100 and 125 times, both included. b) more than 150 times. c) less than or equal to 90 times. d) exactly 200 times.

24. A pair of dice is tossed 100 times. Find the probability of getting a total of seven 25 times.

25. Among 625 random digits, find the probability that the digit '7' appears, a) between 50 and 60 times, both included. b) more than 150 times. c) less than or equal to 90 times. d) exactly 200 times.

26. If 23% of all patients with high blood pressure have bad side effects from a certain kind of medicine, use normal approximation to find the probability that among 120 patients with high blood pressure treated with this medicine more than 32 will have bad side effects.