

Normal Distribution

1. In a normal population with mean 12 and standard deviation 4, it is known that 750 observations exceed 15. Find the total number of observations in the population. (Ans.  $\approx 3310$ )
2. At a certain examination 10% of the students who appeared for the paper in Advanced Mathematics got less than 30 marks and 97% of the students got less than 62 marks. Assuming the distribution is normal, find the mean and the SD of the distribution.  
(Ans.  $\mu = 42.97, \sigma = 10.13$ )
3. It is given that  $X$  and  $Y$  are independent normal variates and  $X \sim N(1, 4)$ ,  $Y \sim N(3, 16)$ . Find the value of  $K$  such that  $P(2X + Y \leq K) = P(4X - Y \geq 2K)$ .  
(Ans.  $K = (5\sqrt{5} + \sqrt{2}) / (\sqrt{5} + 2\sqrt{2})$ )
4. Variable  $X$  is a normal random variable with standard deviation 3. If the probability that  $X$  is less than 16 is 0.84, then the expected value of  $X$  is approximately? (Ans: 13)
5. If  $P\{-3 < Z < -2\} = P\{2 < Z < x\}$ , then find  $x$  (Ans: 3.02)
6. If  $P\{-a < Z < a\} = 2P\{Z < a\} - 1$ , then find  $a$ . (Ans:  $a \in (-\infty, \infty)$ )
7. Find  $x$  (using three type of standard normal table) if  
 (i)  $P\{Z > x\} = 0.05$  (ii)  $P\{Z > x\} = 0.95$  (iii)  $P\{Z < x\} = 0.66$  (iv)  $P\{Z < x\} = 0.40$   
 (v)  $P\{|Z| < x\} = 0.99$  (vi)  $P\{|Z| < x\} = 0.1$  (vii)  $P\{|Z| > x\} = 0.9$  (viii)  $P\{|Z| > x\} = 0.8$   
  
 (Ans: (i) 1.65, (ii) -1.65 (iii) 0.42 (iv) -0.25 (v) 2.17 (vi) 0.13 (vii) -1.64 (viii) 0.26)