Department of Mathematics, Bennett University
EMAT203L (Probability and Statistics)
Tutorial sheet 4

1. Let X be normally distributed with mean 12 and standard deviation 4.

   (a) Find out following probabilities:

   $$P(X \geq 20), \quad P(X > 20), \quad P(X \leq 20), \quad P(0 \leq X \leq 12)$$

   (b) Find z_α for $\alpha = 0.57$.

   (c) Find a such that $P(X > a) = 0.24$.

2. Given that $X \sim N(0,1)$. If $P(-.75 < X < .75) = .42$, without using distribution table find $P(X > .75)$.

3. In the NSE India*, the price (in Rs.) of a share of ACC cement stock is assumed to follow distribution $Y = e^X$, where $X \sim N(2,1)$. Find average price of a share of ACC cement stock.

   (NSE India: National Stock Exchange of India - One of the national share market of India.)

4. The mean yield for one-acre plot is 662 kilos with a standard deviation of 32 kilos. Assuming normal distribution, how many one-acre plots in a batch of 1000 plots would you expect to have yield **(i)** over 700 kilos, and**(ii)** below 650 kilos?

5. The marks obtained by a number of students for a certain subject are assumed to be approximately normally distributed with mean value 65 and with a standard deviation of 5. If 3 students are taken at random from this set, what is the probability that exactly 2 of them will have marks over 70?

6. Let $X_1 \sim N(0,5)$, $X_2 \sim N(1,1)$ and $X_3 \sim N(-2,9)$. If X_1, X_2 and X_3 are independent random variables then what is distribution of $2X_1 - X_2 + X_3 + 7$.

7. If X and Y are independent normal variate with means 6,7, and variances 9, 16, respectively. Determine λ such that

   $$P(2X + Y \leq \lambda) = P(4X - 3Y \geq 4\lambda).$$

8. Let $X \sim B(10, \frac{1}{3})$ and $Y \sim B(15, \frac{1}{3})$. If X and Y are independent, what are mean and variance of random variable $X + Y$?

9. If X and Y are two independent binomial variates with parameters $n_1 = 6$, $p = \frac{1}{2}$; and $n_2 = 4$, $p = \frac{1}{2}$, respectively. Find PMF of $X + Y$.

10. Suppose that the number of telephone calls coming into a telephone exchange between 10 A.M. and 11 A.M., is a random variable with Poisson distribution with parameter 2. Similarly the number of calls arriving between 11 A.M. and 12 noon has a Poisson distribution with parameter 6. If number of calls during the periods 10 A.M.-11 A.M. and 11 A.M.-12 noon are independent, what is the probability that more than 5 calls come in between 10 A.M. and 12 noon?