# EXERCISE – 5.3

***APPLICATIONS OF NORMAL DISTRIBUTION***

**1.** The heights of boys at particular age follows a normal distribution with mean 150.3 cm and variance 25 cm. Find the probability that a boy picked at random from this age group
   **a.** less than 153 cm,
   **b.** more than 158 cm
   **c.** between 150 cm and 158 cm.

   (*Ans* : 0.7054, 0.0618, 0.4621)

**2.** The masses of packages from a particular machine are normally distributed with a mean of 200 g and a standard deviation of 2 g. Find the probability that a randomly selected package from the machine weighs
   **a.** less than 197 g,
   **b.** more than 200.6 g
   **c.** between 198.5 g and 199.5 g

   (*Ans* : 0.0668, 0.4013, 0.1747)

**3.** The average number of calories in a 1.5-ounce chocolate bar is 225. Suppose that the distribution of calories is approximately normal with s 10. Find the probability that a randomly selected chocolate bar will have
   **a.** Less than 200 calories
   **b.** more than 215 calories
   **c.** Between 200 and 220 calories

   (*Ans* : 0.0062, ,0.3023)

**4.** The average credit card debt for college seniors is $3262. If the debt is normally distributed with a standard deviation of $1100, find these probabilities.
   **a.** That the senior owes at least $1000
   **b.** That the senior owes more than $4000
   **c.** That the senior owes between $3000 and $4000

   (*Ans* : 0.9803, 0.2514, 0.3434)

**5.** The average monthly mortgage payment including principal and interest is $982 in the United States. If the standard deviation is approximately $180 and the mortgage payments are approximately normally distributed, find the probability that a randomly selected monthly payment is
   **a.** More than $1000
   **b.** More than $1475
   **c.** Between $800 and $1150

   (*Ans* : 0.4602, 0.0031, 0.6676)

**6.** According to the Federal Highway Administration's 2003 highway statistics the distribution of ages for licensed drivers has a mean of 44.5 years and a standard deviation of 17.1 years. Assuming the distribution of ages is normally distributed, what percentage of the drivers are:

- **a.** Younger than 25 years of age
- **b.** Older than 21 years of age
- **c.** Between the ages of 45 and 65

(*Ans* : 0.1271, 0.9153, 0.373)

**7.** According to the American College Test (ACT), results from the 2004 ACT testing found that students had a mean reading score of 21.3 with a standard deviation of 6.0. Assuming that the scores are normally distributed:

- **a.** Find the probability that a randomly selected student has a reading ACT score less than 20.
- **b.** Find the probability that a randomly selected student has a reading ACT score between 18 and 24.
- **c.** Find the probability that a randomly selected student has a reading ACT score greater than 30

(*Ans* : 0.4142, 0.3825, 0.0735)

**8.** In a survey of South African CEOs, the annual incomes were normally distributed, with a mean of \$7.14 million and a standard deviation of \$0.5 million. Find the probability that a randomly selected CEO has an annual income that is

- **a.** less than \$6.5 million,
- **b.** more than 8 million.
- **c.** between \$7 million and \$7.5 million.

(*Ans* : 0.1003, 0.0427, 0.3745)

**9.** In a recent year, the MCAT scores for the critical analysis and reasoning skills portion of the test were normally distributed, with a mean of 124.9 and a standard deviation of 3.0. Find the probability that a randomly selected medical student who took the MCAT has a critical analysis and reasoning skills score that is

- **a.** less than 120,
- **b.** more than 130.
- **c.** between 122 and 128

(*Ans* : 0.0512, 0.0446, 0.6824)

**10.** The ages of prime ministers of Sri Lanka, when they were first sworn to office, are normally distributed with a mean of 58.21 years and a standard deviation of 11.56 years. Find the probability that the age of a randomly selected prime minister of Sri Lanka when he was sworn to office was

- **a.** less than 50 years,
- **b.** more than 70 years.
- **c.** between 55 and 60 years.

(*Ans* : 0.2388, 0.1539, 0.1709)