

## Assignment: Normal Distribution

Date \_\_\_\_\_

1. The random variable  $X$  is distributed normally with mean 30 and standard deviation 2. Find  $p(27 \leq X \leq 34)$ .
2. The diameters of discs produced by a machine are normally distributed with a mean of 10 cm and standard deviation of 0.1 cm. Find the probability of the machine producing a disc with a diameter smaller than 9.8 cm.
3. The weights of a certain species of bird are normally distributed with mean 0.8 kg and standard deviation 0.12 kg. Find the probability that the weight of a randomly chosen bird of the species lies between 0.74 kg and 0.95 kg.
4. The speeds of cars at a certain point on a straight road are normally distributed with mean  $\mu$  and standard deviation  $\sigma$ . 15% of the cars travelled at speeds greater than  $90 \text{ km h}^{-1}$  and 12% of them at speeds less than  $40 \text{ km h}^{-1}$ . Find  $\mu$  and  $\sigma$ .
5. A random variable  $X$  is normally distributed with mean  $\mu$  and variance  $\sigma^2$ . If  $P(X > 6.2) = 0.9474$  and  $P(X < 9.8) = 0.6368$ , calculate the value of  $\mu$  and of  $\sigma$ .
6. A furniture manufacturer makes tables. A table leg is considered to be oversize if its width is greater than 10.5 cm and undersize if its width is less than 9.5 cm. From past experience it is found that 2% of the table legs that are made are oversize and that 4% of the table legs are undersize. The widths of the table legs are normally distributed with mean  $\mu$  cm and standard deviation  $\sigma$  cm. Find the value of  $\mu$  and of  $\sigma$ .
7. The weights in grams of bread loaves sold at a supermarket are normally distributed with mean 200 g. The weights of 88% of the loaves are less than 220 g. Find the standard deviation.
8. The lengths of a particular species of lizard are normally distributed with a mean length of 50 cm and a standard deviation of 4 cm. A lizard is chosen at random.
  - (a) Find the probability that its length is greater than 45 cm.
  - (b) Given that its length is greater than 45 cm, find the probability that its length is greater than 55 cm.

Answer of assignment normal distribution

1. 0.910 (3 sf) (accept 0.911)
2. 0.0227
3. 0.586
4.  $\mu = 66.6, \sigma = 22.6$
5.  $\mu = 1.83$  and  $\sigma = 9.16$
6.  $\sigma = 0.263$  and  $\mu = 9.96$
7.  $\sigma = 17.0$  (grams)
8. (a) 0.894

(b) 0.118

