

Section 1: The Normal distribution

Solutions to Exercise level 1

1. $X \sim N(144, 5^2)$

(i) $P(X < 150) = 0.8849$

(ii) $P(X > 146) = 0.3446$

(iii) $P(X > 136) = 0.9452$

(iv) $P(X < 140) = 0.2119$

2. $X \sim N(12.7, 0.75^2)$

(i) $P(X < 12) = 0.1753$

(ii) $P(12.3 < X < 13.1) = 0.4062$

(iii) $P(12.5 < X < 13.5) = 0.4621$

3. $X \sim N(2500, 30^2)$

(i) (a) $P(X > 2520) = 0.2525$

(b) $P(X < 2470) = 0.1587$

(c) $P(2488 < X < 2509) = 0.2733$

(ii) (a) Need a such that 35% of the components have lifetimes greater than a .

$$P(X > a) = 0.35$$

$$P(X < a) = 0.65$$

$$a = 2512 \text{ hours}$$

(b) 50% of the components have lifetimes greater than the mean.
So 50% of the components would last 2500 hours.

(c) Need b such that 80% of the components have lifetimes greater than b .

$$P(X > b) = 0.8$$

$$P(X < b) = 0.2$$

$$b = 2475 \text{ hours}$$