MATH1001 Homework Solution

Chapter 4

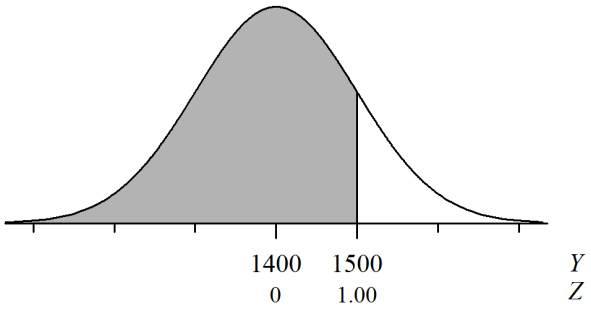
4.3.3

μ = 1400; σ = 1400

(a) For y = 1500,

$z = \frac{y-\mu}{\sigma} = \frac{1500-1400}{100} = 1.00.$

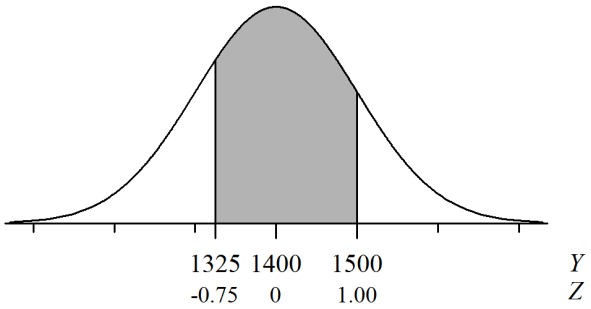
From Table 3, the area is 0.8413 or 84.13%.



(b) For y = 1325,

$z = \frac{y-\mu}{\sigma} = \frac{1325-1400}{100} = -0.75.$

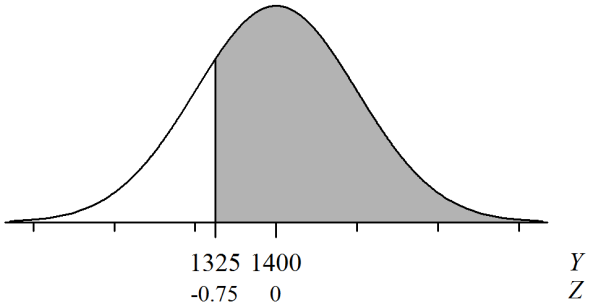
From Table 3, the area below 1325 is 0.2266.
From part (a), the area below 1500 is 0.8413.
Thus, the percentage with 1325 ≤ Y ≤ 1500 is
0.8413 - 0.2266 = 0.6147 or 61.47%.



(c) For y = 1325,

$z = \frac{y-\mu}{\sigma} = \frac{1325-1400}{100} = -0.75.$

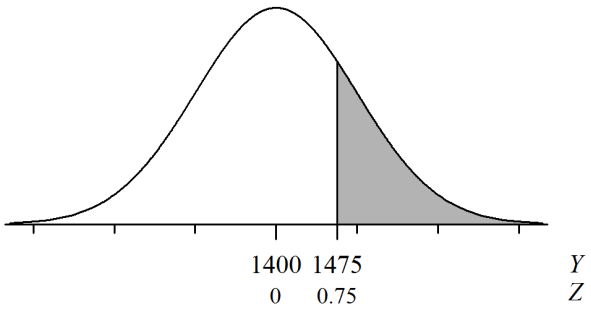
From Table 3, the area below 1325 is 0.2266.
Thus, the percentage with Y ≥ 1325 is
1 - 0.2266 = 0.7734 or 77.34%.



(d) For y = 1475,

$z = \frac{y-\mu}{\sigma} = \frac{1475-1400}{100} = 0.75.$

From Table 3, the area below 1475 is 0.7734.
Thus, the percentage with Y ≥ 1475 is
1 - 0.7734 = 0.2266 or 22.66%.



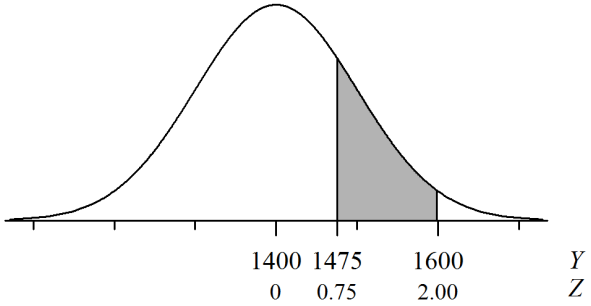
(e) For y = 1600,

$z = \frac{y-\mu}{\sigma} = \frac{1600-1400}{100} = 2.00.$

From Table 3, the area below 1600 is 0.9772.

In part (d) we found that the area below 1475 is 0.7734.

Thus, the percentage with 1475 ≤ Y ≤ 1600 is 0.9772 - 0.7734 = 0.2038 or 20.38%.



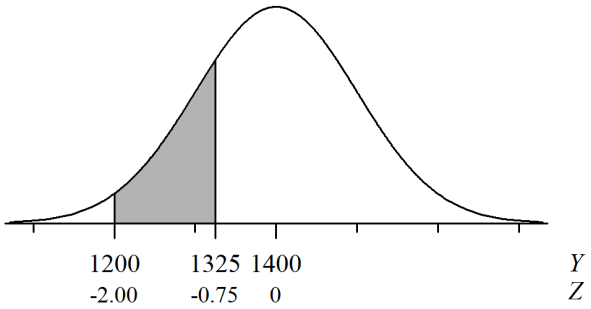
(f) For y = 1200,

$z = \frac{y-\mu}{\sigma} = \frac{1200-1400}{100} = -2.00.$

From Table 3, the area below 1200 is 0.0228.

In part (c) we found that the area below 1325 is 0.2266.

Thus, the percentage with 1200 ≤ Y ≤ 1325 is 0.2266 - 0.0028 = 0.2038 or 20.38%.



4.3.17

(a) $z = \frac{y-\mu}{\sigma}$ = (200-245)/40 = -1.125; 87%

(b) In Table 3, the area closest to 0.6 is 0.5987, corresponding to z = 0.25. Thus, the 60th percentile y* satisfies the equation

$$0.25 = \frac{y^*-245}{40} \text{ which yields } y^* = (0.25)(40) + 245 = 255 \text{ min.}$$

(c) 240 minutes = 4 hours. More runners than expected finished in just under 4 hours; fewer than expected finished in just over 4 hours. This may be due to some runners pushing themselves to break the 4 hour mark.

4.4.6

(a) At the low end of the distribution the normal probability plot is fairly straight, indicating that the data agree with what one would expect from a normal distribution. Thus, the times for the fastest riders are roughly equal to the times one would expect if the data came from a truly normal distribution.

(b) At the high end of the distribution the normal probability plot bends upward, indicating that the times are greater than what one would expect from a normal distribution. Thus, the times for the slowest riders are worse than the times one would expect.