5. Charlie is training for three events: a 1500 m swim, a 40 km bike ride and a 10 km run.

From past experience his times, in minutes, for each of the three events independently have the following distributions.

$S \sim N(41, 5.2^2)$ represents the time for the swim
$B \sim N(81, 4.2^2)$ represents the time for the bike ride
$R \sim N(57, 6.6^2)$ represents the time for the run

(a) Find the probability that Charlie's total time for a randomly selected swim, bike ride and run exceeds 3 hours.

(5)

(b) Find the probability that the time for a randomly selected swim will be at least 20 minutes quicker than the time for a randomly selected run.

(4)

Given that $P(S + B + R > t) = 0.95$

(c) find the value of t

(3)

A triathlon consists of a 1500 m swim, immediately followed by a 40 km bike ride, immediately followed by a 10 km run.

Charlie uses the answer to part (a) to find the probability that, in 6 successive independent triathlons, his time will exceed 3 hours on at least one occasion.

(d) Find the answer Charlie should obtain.

(3)

Jane says that Charlie should not have used the answer to part (a) for the calculation in part (d).

(e) Explain whether or not Jane is correct.

(2)

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

Question 5 continued

Question 5 continued

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

Question 5 continued

(Total for Question 5 is 17 marks)

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA