

Sample solutions to the 2021 VCAA NHT papers

Specialist Mathematics Examination 2

Question 19

X and Y are independent random variables with variances of 3 and 7 respectively.

Given the random variable $Z = 2X - 3Y + 5$, the standard deviation of Z is closest to

- A. 5.20
- B. 5.66
- C. 8.66
- D. 8.94
- E. 11.40

$$\begin{aligned}\text{Var}(Z) &= 2^2 \times \text{Var}(X) + (-3)^2 \times \text{Var}(Y) \\ &= 4 \times 3 + 9 \times 7 \\ &= 75 \\ \text{sd}(Z) &= \sqrt{75} = 8.66\end{aligned}$$

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Mathematical Methods Examination 2

Question 6

The sum of the first four positive solutions to the equation $\tan(2x) - 1 = 0$ is

- A. $\frac{3\pi}{2}$
- B. $\frac{5\pi}{2}$
- C. 2π
- D. $\frac{7\pi}{2}$
- E. 4π

$$\begin{aligned}\tan(2x) &= 1 \\ 2x &= \frac{\pi}{4}, \frac{5\pi}{4}, \frac{9\pi}{4}, \frac{13\pi}{4} \\ x &= \frac{\pi}{8}, \frac{5\pi}{8}, \frac{9\pi}{8}, \frac{13\pi}{8} \\ \frac{\pi}{8}(1 + 5 + 9 + 13) &= \frac{28\pi}{8} = \frac{7\pi}{2}\end{aligned}$$

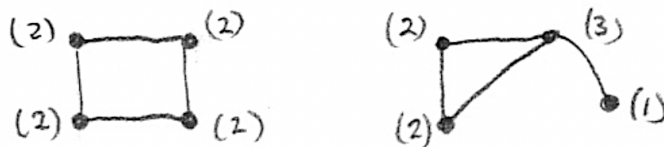
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Further Mathematics Examination 1 Module 2 – Networks and Decision Mathematics

Question 1

For a connected graph with four vertices and four edges, the sum of the degrees of the vertices is

- A. 2
- B. 4
- C. 6
- D. 8
- E. 10



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