Sample solutions to the 2024 VCAA NHT papers

Specialist Mathematics Examination 2

Question 7

Let $y = f(x)$ be the solution to the differential equation $\frac{dy}{dx} = 1 + 2y$ with the initial condition $f(0) = 1$.

What is the approximation for $f(1)$ using Euler's method, starting at $x = 0$ with a step size of 0.5?

A. 1.5
B. 2.5
C. 3.5
D. 4.5
E. 5.5

$f(0) = 1$

$f(0.5) = 1 + 0.5(1 + 2 \times 1) = 1 + 0.5 \times 3 = 2.5$

$f(1) = 2.5 + 0.5(1 + 2 \times 2.5) = 2.5 + 0.5 \times 6 = 5.5$

Mathematical Methods Examination 2

Question 2

For two independent events, A and B, it is known that $\Pr(A) = 0.6$ and $\Pr(A \cup B) = 0.92$.

$\Pr(B)$ is equal to

A. $\frac{4}{5}$
B. $\frac{4}{15}$
C. $\frac{8}{15}$
D. $\frac{8}{25}$
E. $\frac{1}{5}$

$\Pr(A \cap B) = 0.6 \Pr(B)$

$0.92 = 0.6 + \Pr(B) - 0.6 \Pr(B)$

CAS: solve $(0.92 = 0.6 + x - 0.6x, x)$

General Mathematics Examination 1

Question 5

The heights of a group of Year 9 students were measured and the standard deviation was found to be 12.25 cm.

One student with a height of 174.6 cm had a standardised score of $z = 0.45$

The mean height of this group of students, in centimetres, was closest to

A. 161.9
B. 169.1
C. 180.1
D. 186.4
E. 187.3

$\frac{174.6 - \bar{x}}{12.25} = 0.45$

$\bar{x} = 169.0875$

