

Solutions to the 2023 VCAA sample questions

Specialist Mathematics Examination 2

Question 1

Consider the following statement.

$\begin{matrix} P & Q \\ \text{'For all integers } n, \text{ if } n^2 \text{ is even, then } n \text{ is even.'} \end{matrix}$

Which one of the following is the contrapositive of this statement?

- A. For all integers n , if n^2 is odd, then n is odd.
- B. There exists an integer n such that n^2 is even and n is odd.
- C. There exists an integer n such that n is even and n^2 is odd.
- ☒ D. For all integers n , if n is odd, then n^2 is odd.
- E. For all integers n , if n is even, then n^2 is even.

Note: the contrapositive of $P \Rightarrow Q$ is $(\text{not } Q) \Rightarrow (\text{not } P)$

To order a full copy of these solutions please point your browser to
<http://russellboyle.com/orders.html>

Mathematical Methods Examination 1

Question 3 (3 marks)

Find the general solution for $2\sin(x) = \tan(x)$ for $x \in \mathbb{R}$.

$$\begin{aligned} 2\sin(x) &= \frac{\sin(x)}{\cos(x)} \\ \sin(x) \left(2 - \frac{1}{\cos(x)} \right) &= 0 \\ \sin(x) = 0 &\text{ or } \cos(x) = \frac{1}{2} \\ x = n\pi &\text{ or } 2n\pi \pm \frac{\pi}{3} \text{ where } n \in \mathbb{Z} \end{aligned}$$

To order a full copy of these solutions please point your browser to
<http://russellboyle.com/orders.html>

General Mathematics Examination 1

Question 21

Ray deposited \$7000 in an investment account earning interest at the rate of 3% per annum, compounding quarterly.

A rule for the balance, R_n , in dollars, after n years is given by

A. $R_n = 7000 \times 0.03^n$

B. $R_n = 7000 \times 1.03^n$

C. $R_n = 7000 \times 0.03^{4n}$

D. $R_n = 7000 \times 1.0075^n$

☒ E. $R_n = 7000 \times 1.0075^{4n}$

$$1 + \frac{3}{400} = 1.0075$$
$$\therefore R_n = 7000 \times 1.0075^{4n}$$

To order a full copy of these solutions please point your browser to
<http://russellboyle.com/orders.html>