

Sample solutions to the 2023 VCAA NHT papers

Specialist Mathematics Examination 2

Question 4

If $z = a + bi$, where $a, b \in \mathbb{R}$ and $a > b > 0$, then $\text{Arg}(z + i\bar{z})$ is equal to

- A. $-\frac{3\pi}{4}$
- B. $-\frac{\pi}{4}$
- C. $-\frac{3\pi}{4}$ or $\frac{\pi}{4}$
- ☒ D. $\frac{\pi}{4}$
- E. $\frac{5\pi}{4}$

CAS: $z := a + b \cdot i$
 $z + i \cdot \text{conj}(z)$

$$\begin{aligned} (a+b) + (a+b)i \\ \tan(\theta) &= \frac{a+b}{a+b} \\ &= 1 \\ \therefore \theta &= \frac{\pi}{4} \end{aligned}$$

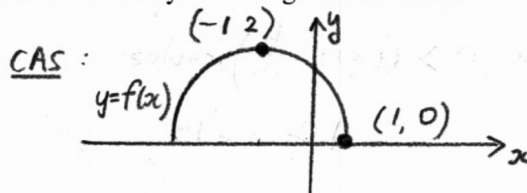
To order a full copy of these solutions please point your browser to
<https://russellboyle.com/orders.html>

Mathematical Methods Examination 2

Question 3

The function $f(x) = \sqrt{3 - 2x - x^2}$ is strictly decreasing over the domain

- A. $(-3, 3)$
- ☒ B. $(-1, 1)$
- C. $(-3, 1)$
- D. $[-1, 1]$
- E. $[-3, 1]$



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

Further Mathematics Examination 1

Question 23

Mo invested \$10 000 into an account that earns interest, compounding fortnightly. The balance, in dollars, after n fortnights, M_n , can be modelled by the recurrence relation shown below.

$$M_n = 10\,000 \qquad M_{n+1} = 1.001M_n$$

The effective annual rate of interest for Mo's investment is closest to

- A. 2.57%
- B. 2.60%
- ☒ C. 2.63%
- D. 2.66%
- E. 2.69%

$$\begin{aligned} 0.001 &= 0.1\% \text{ per fortnight} \\ &= 0.1\% \times 26 \\ &= 2.6\% \text{ p.a.} \end{aligned}$$

CAS: $\text{eff}(2.6, 26)$

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