TI-Nspire[™] CAS Assisted Solutions VCE Specialist Mathematics Written Sample Examination 2 Section A

Explanatory notes:

Note that the VCAA only supplies multiple-choice answers to sample papers. Every effort has been made to ensure that these solutions are correct.

The author of these solutions has no affiliation with the VCAA.

SECTION A – Multiple-choice questions Question 1: Answer: B

Working	TI-Nspire CAS screenshot(s)
So $a=3$ and $b+13=5^2 \Rightarrow b=12$.	I.1 ★ 2016 VCE E2



Question 2: Answer: B





Question 3: Answer: D

Working	TI-Nspire CAS screenshot(s)
$f(x) = \frac{(x-1)(x-3)}{(x+2)(x-3)}$	 ₹2.1 2.2 3.1 *2016 VCE E2 - RAD RAD
so $f(x) = 1 - \frac{3}{x+2}, x \neq 3$	$f(x) := \frac{x^2 - 4 \cdot x + 3}{x^2 - x - 6}$ Done
	$factor(\{x^{2}-4 \cdot x+3, x^{2}-x-6\}) \\ \{(x-3) \cdot (x-1), (x-3) \cdot (x+2)\}$
	6.67 ¹ <i>y</i>
	f1(x)=f(x)
	6.67 f1 : (3, undef)



Question 4: Answer: D

Working Use of the expand command	TI-Nspire CAS screenshot(s)
suggests that the answer is D .	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$
	$(3.1 3.2 4.1) *2016 \text{ VCE} = E2 \implies \text{RAD} () \\ expand (\frac{7 \cdot x - 5}{(x - 4)^2 \cdot (x^2 + 9)}) \\ (x - \frac{539}{625 \cdot (x^2 + 9)} - \frac{9}{625 \cdot (x - 4)} + \frac{23}{25 \cdot (x - 4)^2}) \\ (x - \frac{539}{625 \cdot (x^2 + 9)} - \frac{9}{625 \cdot (x - 4)} + \frac{23}{25 \cdot (x - 4)^2}) \\ (x - \frac{1}{25 \cdot (x - 4)} + \frac{1}{25 \cdot (x - 4)^2}) \\ (x - \frac{1}{25 \cdot (x - 4)^2}) \\ (x -$



Question 5: Answer: D

Working You could use TI-Nspire CAS to	TI-Nspire CAS screenshot(s)
check some (or all) of the alternatives.	3.2 4.1 5.1 ▶ *2016 VCE E2 → RAD (1) ×
x + y = 4 from alternative D .	$(z+conj(z))^2-(z-conj(z))^2=16$
	$4 \cdot x^2 + 4 \cdot y^2 = 16$
	$\frac{4 \cdot x^2 + 4 \cdot y^2 = 16}{4} \qquad \qquad x^2 + y^2 = 4$

Question 6:

Answer: B

Working	TI-Nspire CAS screenshot(s)
From the conjugate root theorem,	
z = -3i is also a root.	TI-Nspire CAS functionality does not offer
So B .	any assistance here.

Question 7:

Answer: B





Question 8: Answer: B



Question 9: Answer: E





Question 10: Answer: C

Working	TI-Nspire CAS screenshot(s)
$V = \pi \int_{0}^{\frac{\pi}{2}} x^{2} dy$ $= \frac{\pi}{8} \int_{0}^{\frac{\pi}{2}} (1 - \cos(2y)) dy$	$ \begin{array}{c c} \hline \hline & 8.2 & 9.1 & 10.1 \\ \hline & \times 2016 VCE E2 $< $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $$
	$x^{2} = \left(\frac{\sin(y)}{2}\right)^{2}$ $x^{2} = \frac{(\sin(y))^{2}}{4}$
	$ \Delta \text{ tCollect}\left(x^2 = \frac{(\sin(y))^2}{4}\right) x^2 = \frac{1}{8} - \frac{\cos(2 \cdot y)}{8} \Box \Box \Box \Box \Box \Box \Box \Box \Box $
	$y = \sin^{-1}(2 \cdot x) x = \left\{ 0, \frac{1}{2} \right\} \qquad \qquad y = \left\{ 0, \frac{\pi}{2} \right\}$

Question 11:

Answer: C

Working 112.4°	TI-Nspire CAS screenshot(s)
The Notes application can be used to calculate the angle between two vectors.	9.1 10.1 11.1 *2016 VCE E2 RAD (INCOMPARING) Angle between two vectors Vector 1: $\mathbf{a}:= \begin{bmatrix} 3 & 6 & -2 \end{bmatrix} \times \begin{bmatrix} 3 & 6 & -2 \end{bmatrix}$ Vector 2: $\mathbf{b}:= \begin{bmatrix} 2 & -2 & 1 \end{bmatrix} \times \begin{bmatrix} 2 & -2 & 1 \end{bmatrix}$ $\boldsymbol{\theta}:=\cos^{-1}\left(\frac{\operatorname{dotP}(\mathbf{a},\mathbf{b})}{\operatorname{norm}(\mathbf{a})\cdot\operatorname{norm}(\mathbf{b})}\right) \times 1.96162$ $\boldsymbol{\theta} \ge DD \times 112.393^{\circ}$ $\boldsymbol{\theta} \ge DMS \times 112^{\circ}23'33.6761''$



Question 12: Answer: E

Working	TI-Nspire CAS screenshot(s)
Working $\underline{a} \cdot \underline{b} = \frac{8}{3}$ The Notes application can be used to calculate the scalar resolute.	TI-Nspire CAS screenshot(s) $\begin{array}{c ccccccccccccccccccccccccccccccccccc$

Question 13: Answer: B

Working	TI-Nspire CAS screenshot(s)
The Notes application can be used to calculate a velocity vector (a particle's direction of motion).	11.1 12.1 13.1 *2016 VCE E2 \bigtriangledown RAD () Velocity vector and direction of motion $\mathbf{r}(t) := \begin{bmatrix} 3-t & -6 \cdot \sqrt{t} & 5 \end{bmatrix} * Done$ $\frac{d}{dt}(\mathbf{r}(t)) * \begin{bmatrix} -1 & \frac{-3}{\sqrt{t}} & 0 \end{bmatrix}$ $\frac{d}{dt}(\mathbf{r}(t)) t=9 * \begin{bmatrix} -1 & -1 & 0 \end{bmatrix}$

Question 14: Answer: C

Working	TI-Nspire CAS screenshot(s)
The diagonals of a rhombus are perpendicular so: $(\underline{a} + \underline{b}) \cdot (\underline{a} - \underline{b}) = 0$	TI-Nspire CAS functionality does not offer any assistance here.



Question 15: Answer: A

Working	TI-Nspire CAS screen	shot(s)
$F = 12\left(3x - \frac{3x^2}{2}\right)$	< 13.1 14.1 15.1 ▶ *2016	VCE E2 - RAD 🚺 🗙
	$v = \sqrt{3 \cdot x^2 - x^3 + 16}$	$\sqrt{-x^3+3 \cdot x^2+16}$
	$\triangle \frac{d}{dx} \left(\frac{v^2}{2} \right)$	$\frac{-3 \cdot x \cdot (x-2)}{2}$
	$\operatorname{expand}\left(\frac{-3 \cdot x \cdot (x-2)}{2}\right)$	$3 \cdot x - \frac{3 \cdot x^2}{2}$

Question 16:

Answer: D





Question 17: Answer: D

Working	TI-Nspire CAS screenshot(s)
Resolving forces vertically and solving for <i>T</i> gives $T = 4\sqrt{3}g$.	$ \begin{array}{ $

Question 18: Answer: E

Working	TI-Nspire CAS screenshot(s)
E(Z) = E(X) - 3E(Y) = 10-9 = 1 $var(Z) = (1)^{2} var(X) + (-3)^{2} var(Y)$ = 8 ² + 9 × 2 ² = 100 sd(Z) = 10	<pre> (16.1 17.1 18.1 ▶ *2016 VCE E2 → RAD () Expectation algebra $\mu x:=10 + 10$</pre>
The Notes application can be used to perform expectation calculations.	

Working	TI-Nspire CAS screenshot(s)
Let \overline{X} be the class mean. $E(\overline{X}) = 30$ and $var(\overline{X}) = \frac{7^2}{20}$ $Pr(\overline{X} > 32) = 0.1007$ The Notes application can be used to perform normal distribution calculations.	(17.1 18.1 19.1) *2016 VCE E2 → RAD () × Normal distribution calculations $\mu:=30 + 30$ sigm a:=7 + 7 $n:=20 + 20$ normCdf $\left(32, \infty, \mu, \frac{\text{sigm a}}{\sqrt{n}}\right) + 0.100668$

Question 20:

Answer: C

Working	TI-Nspire CAS screenshot(s)
A type I error is made where H_0 is	
rejected when H_0 is true.	TI-Nspire CAS functionality does not offer
	any assistance here.

