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Mini Test Chap 4, 5 & 6

Semester One 2018
Mathematics Methods
Calc Free
(Formula sheet allowed)

Name: Solutions

Time: 30 minutes **Total**: /26 marks

Working needs to be shown for full marks

Question 1 [2 marks]

Find the axes intercepts of the curve with equation $y = -2\sqrt{4-x} + 3$.

$x=0$ $y = -2\sqrt{4} + 3$
$= -4+3$
$= -1$ $(0,-1)$ ✓

$y=0$ $0 = -2\sqrt{4-x} + 3$
$-3 = -2\sqrt{4-x}$
$\frac{3}{2} = \sqrt{4-x}$
$4-x = \frac{3^2}{2^2}$

$4 - x = \frac{9}{4}$
$x = 4 - \frac{9}{4}$
$= \frac{7}{4}$

$(\frac{7}{4}, 0)$ ✓

Question 2 [1 marks]

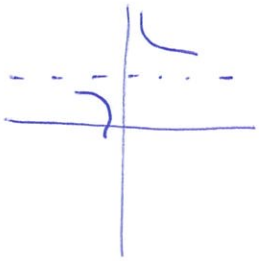
Write down the equation of the circle with centre (2, –1) and radius 6.

$(x-2)^2 + (y+1)^2 = 36$ ✓

Question 3 [2 marks]

Give the equation of the asymptotes of the rectangular hyperbola with equation $y = \frac{2}{x} + 3$.

↑ Dilation $\frac{1}{2}$ ↑ Up 3



$\therefore$ $x = 0$ ✓
$y = 3$ ✓

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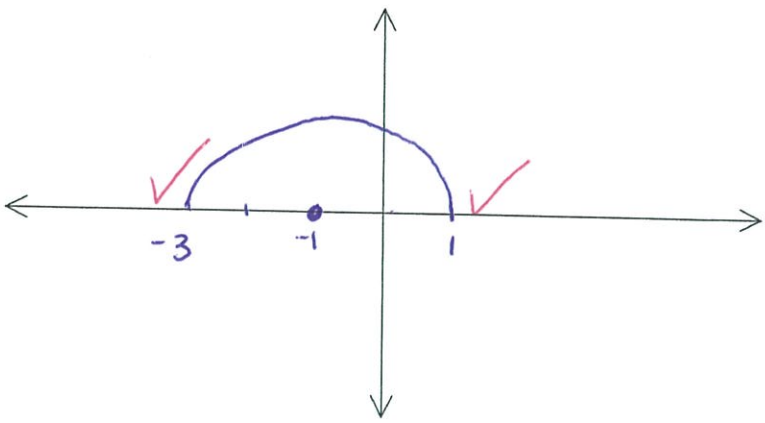
Question 4 **[3 mark]**

Sketch the graph of the semicircle $y = -\sqrt{4-(x+1)^2}$. Clearly label the centre and the axes intercepts.

Centre $(-1,0)$ ✓

radius $= 2$



Question 5 **[2 marks]**

Determine the value of k, the constant of variation, and hence complete the table of values, if it is known that $y \propto \sqrt{x}$.

$y = k\sqrt{x}$

$2 = k\sqrt{2}$

$\therefore k = \sqrt{2}$

x	2	4	32
y	2	$2\sqrt{2}$	8

✓ ✓

$y = \sqrt{2}\sqrt{x}$

If $x = 4$ $\quad y = \sqrt{2}\sqrt{4}$

$= 2\sqrt{2}$

If $y = 8$ $\quad 8 = \sqrt{2}\sqrt{x}$

$\sqrt{x} = \frac{8}{\sqrt{2}}$

$x = \frac{8^2}{2}$

$= 32$

Question 6 [2,2= 4 marks]

a varies directly as b^2 and inversely as c, and $a = 1$ when $b = 2$ and $c = 3$. Find:

a a when $b = 3$ and $c = 2$

$a = \frac{kb^2}{c}$

$1 = \frac{k(4)}{3}$

$k = \frac{3}{4}$ ✓

$a = \frac{\frac{3}{4}b^2}{c}$

$= \frac{\frac{3}{4}(9)}{2}$

$= \frac{3}{4} \times \frac{9}{1} \times \frac{1}{2}$

$= \frac{27}{8}$ ✓

b c when $b = 4$ and $a = 2$.

$a = \frac{3b^2}{4c}$

$2 = \frac{3(4^2)}{4c}$ ✓

$c = \frac{3 \times 16}{4 \times 2}$

$c = \frac{12}{2}$

$= 6$ ✓

Question 7 [1 marks]

What is the maximal domain of the function f with rule $f(x) = \sqrt{5x - 7}$.

$x \geq \frac{7}{5}$ ✓ or $[\frac{7}{5}, \infty)$

Question 8 [2 marks]

What are the co-ordinates of the point (3, 5) after a reflection in the x-axis followed by a translation of 2 units in the positive direction of the x-axis.

$(3,5) \xrightarrow{\text{reflection } x} (3,-5) \longrightarrow (5,-5)$ ✓ ✓

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Question 9 [1,3= 4 marks]

For the function with rule $f(x) = 2x + 5$ find:

a $f(2) + f(3)$

$f(2) = 4 + 5$
$= 9$
$f(3) = 6 + 5$
$= 11$

$\therefore f(2) + f(3) = 20$ ✓

d $f(a + 2) - f(a - 2)$

$f(x) = 2x + 5$
$f(a+2) = 2(a+2) + 5$
$= 2a + 4 + 5$
$= 2a + 9$ ✓
$f(a-2) = 2(a-2) + 5$
$= 2a - 4 + 5$
$= 2a + 1$ ✓
$\therefore f(a+2) - f(a-2) = 2a + 9 - (2a + 1)$
$= 8$ ✓

Question 10 [5 marks]

What is the sequence of transformations that takes the graph of $y = x^2$ to the graph of $y = 2(-x - 3)^2 + 4$.

✓ Translation of 3 units in the positive x axis. (horizontal)
✓ Reflection thru the y axis.
✓ Dilation of factor 2 from the x axis.
✓ Translation of factor 4 in the positive y axis (vertical)

Correct Order. ✓

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