LORETO KIRRIBILLI

MARIA REGINA ANGELORUM

CRUCI DUM SPIRO FIDO

2012

YEAR 11 MATHEMATICS

TERM 2 ASSESSMENT TASK

Date: Tuesday, 29th May 2012

Time allowed: 45 minutes (plus 2 minutes reading time)

Total marks: 42 marks

Directions to Candidates

- Attempt all questions.
- Marks are indicated next to each question.
- All necessary working should be shown.
- Board-approved calculators may be used.
- Begin each question on a new page with your student number clearly written at the top.

Outcomes

A student:

P2 provides reasoning to support conclusions which are appropriate to the context.
P3 performs routine arithmetic and algebraic manipulation involving surds and simple rational expressions.
P4 chooses and applies appropriate arithmetic, algebraic and graphical techniques.
P5 understands the concept of a function and the relationship between a function and its graph.

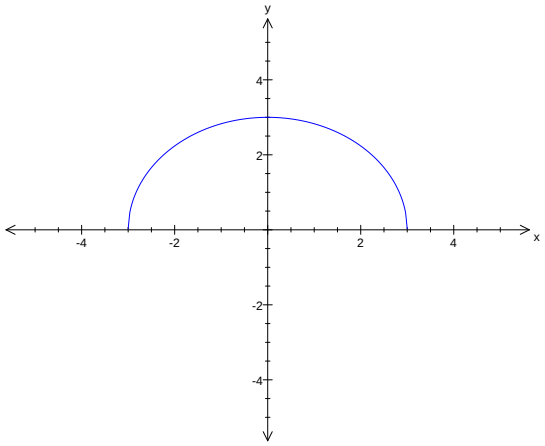
Student Name: _____

Student Number: _____

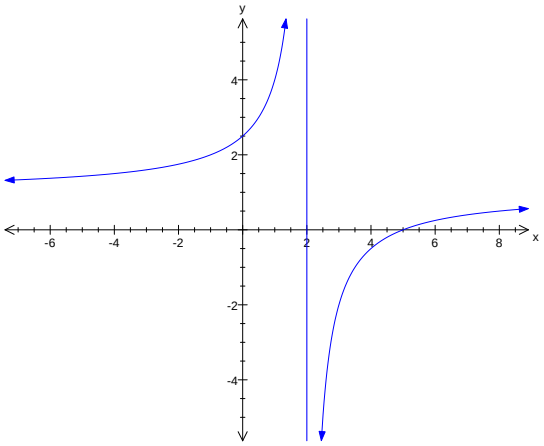
Question 1 **(10 marks)** **Marks**

(a) Which one of the following is not a function. **1**

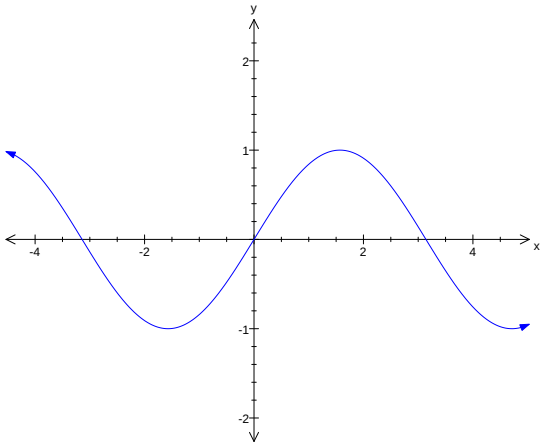
(A)



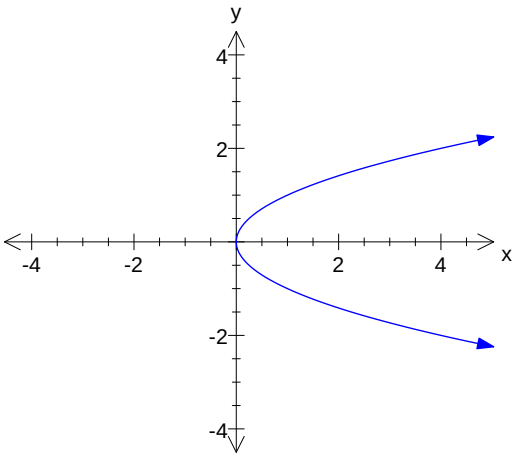
(B)



(C)



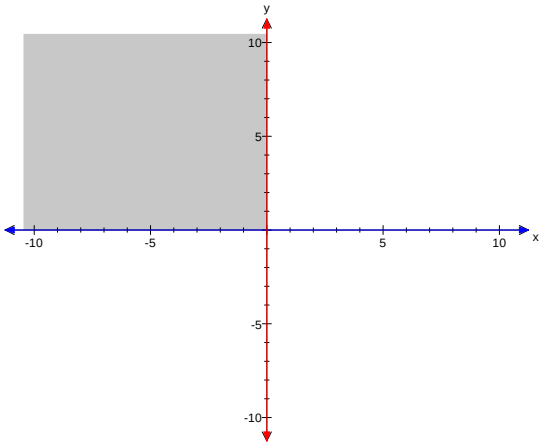
(D)



(b) The function $y = x^2 + 3$ is translated 1 unit to the left. The new equation would be: **1**

(A) $y = x^2 + 2$ (B) $y = x^2 + 4$ (C) $y = (x-1)^2 + 3$ (D) $y = (x+1)^2 + 3$

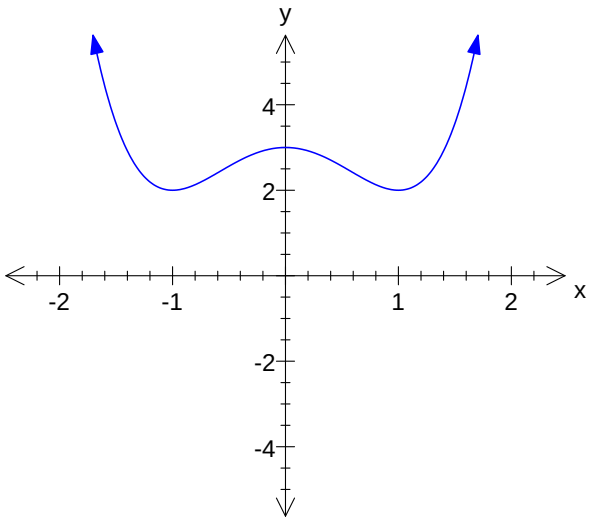
(c) Which pair of inequalities best describes the region shaded below? **1**



(A) $y < 0$ and $x > 0$ (B) $y < 0$ and $x < 0$ (C) $y > 0$ and $x > 0$ (D) $y > 0$ and $x < 0$

Question 1 (continued) **Marks**

(d) Consider the sketch of $y = f(x)$ below.



(i) Is $y = f(x)$ a function? Explain why. **1**

(ii) State the domain and range of $y = f(x)$ **2**

(iii) Is $y = f(x)$ an even or odd function? Justify your answer. **2**

(e) Write down the gradient and y-intercept of the line $7x - 2y = 3$ **2**

Question 2 (12 Marks) **Marks**

(a) If $f(x)=x^3-4x^2+7x-10$ find the value of $f(-2)$ **1**

(b) The correct domain for the following circle is: **1**

$$(x-1)^2+(y+3)^2=4$$

(A) $-1\le x\le -5$ (B) $-3\le x\le 1$ (C) $-1\le x\le 3$ (D) $1\le x\le 5$

(c) State the domain of $y=\dfrac{1}{\sqrt{3-2x}}$ **2**

(d) Draw a neat sketch of $y=-2^x$ for the restricted domain $-2\le x\le 3$. **3**

(e) Draw a neat sketch of $y=\dfrac{2}{x}-1$ showing: **3**

(i) the x-intercept

(ii) any vertical or horizontal asymptotes

(f) (i) Find the axis of symmetry of the parabola $y=x^2+2x+7$. **1**

(ii) Hence or otherwise, find the vertex of this parabola. **1**

Question 3 (10 marks) **Marks**

(a) The function f (x) is defined by the rule

$$f(x)=\begin{cases} -2 & \text{if } x \le 0 \\ x^2+1 & \text{if } x>0 \end{cases}$$

(i) Find the value of $f(0)+f(6)$ **2**

(ii) Draw a neat sketch of the function f (x). (use pencil) **3**

(b) (i) On the same sketch graph $y=|2x-1|$ and $y=3$ **3**
Use a pencil and a third of a page.

(ii) Using your graph, or otherwise, find the solution to $|2x-1| \le 3$ **2**

Question 4 **(10 marks)** **Marks**

(a) (i) Find the point(s) of intersection of the following parabola and straight line. **2**

$$y = (x+2)(x-3) \text{ and } y = x+2$$

(ii) On the same number plane, draw a neat sketch of each function. **2**

(ii) Shade the region on your sketch where **2**

$$y \geq (x+2)(x-3) \text{ and } y - x \leq 2$$

(b) Marty was given the graph of $y = f(x)$. He was then asked to do the following translations **4**

(i) $y = f(x) - 3$

(ii) $y = -f(x)$

(iii) $y = f(x+2)$

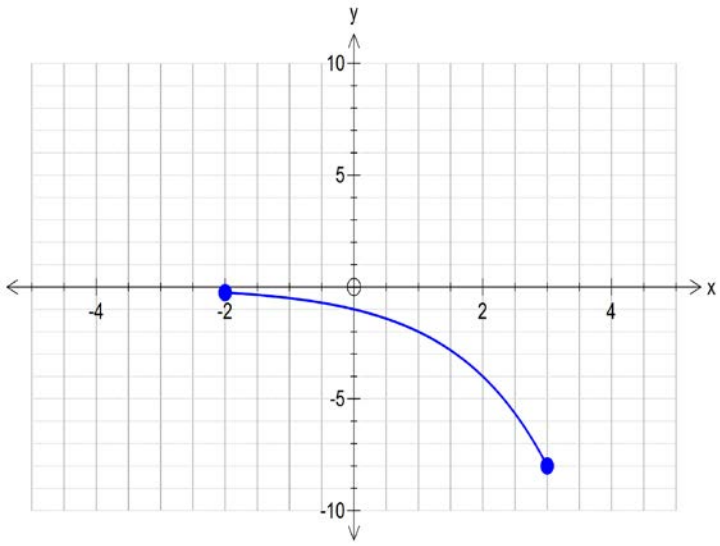
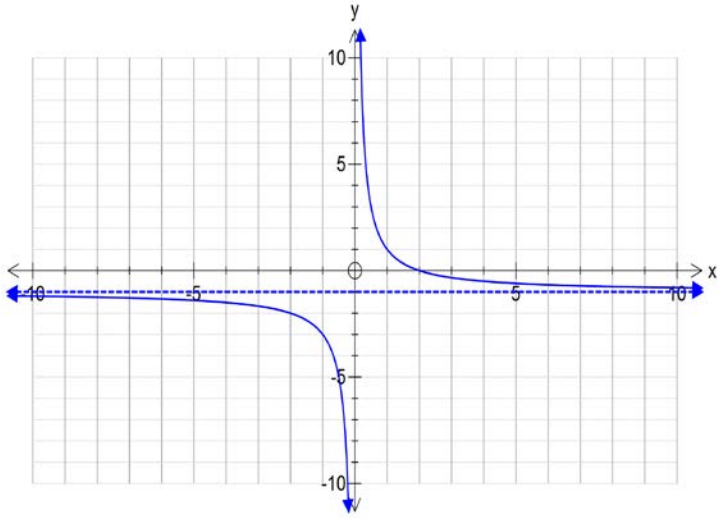
(iv) $y = 2f(x)$

Briefly explain how Marty would have changed his sketch to accommodate each translation.

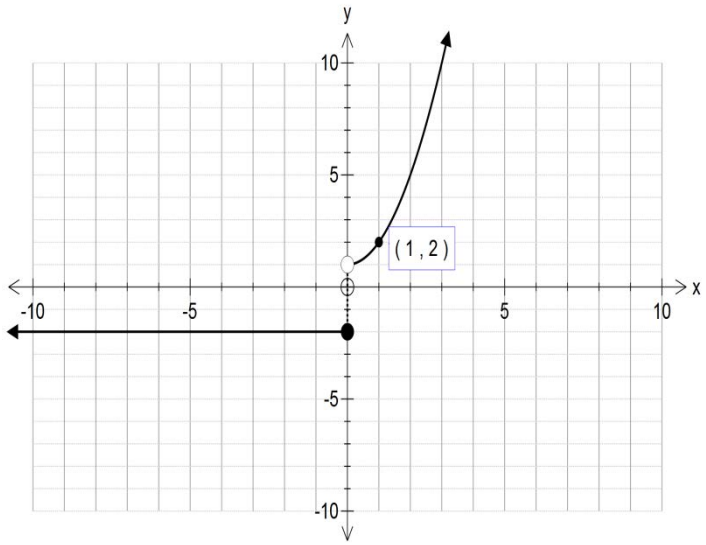
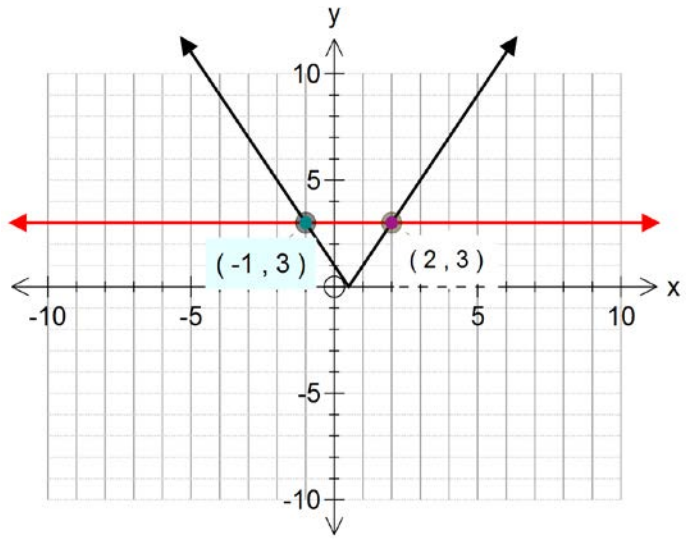
END OF EXAM

2012 Year 11 Mathematics Term 2 Solutions and Marking Criteria

Part	Solutions to Question 1	Mks	Marking Criteria
(a)	D	**1**	Correct answer
(b)	D	**1**	Correct answer
(c)	D	**1**	Correct answer
(d) i)	y = f(x) is a function because for every x-value there is only one y value	**1**	NB: 'because it passes the vertical line test' was not sufficient explanation
(d) ii)	Domain: all real x Range: all real y, $y \geq 2$	**2**	Both domain and range correct
		1	Either domain or range correct
(d) iii)	Function is even because the graph is reflected in or symmetrical about the y-axis OR Function is even because the f(x) = f(-x)	**2**	Correct answer with reason
		1	Correct statement as even
(e)	$7x - 2y = 3$ $2y = 7x - 3$ $y = \frac{7}{2}x - \frac{3}{2}$ gradient = 3.5 y-intercept = -1.5	**2**	Correct answers
		1	Either gradient correct or y-intercept correct or gradient/intercept form of the equation correct
	Communication for Question 1 – 3 marks (d) i) (d) ii)	 **1** **2**	 Clear and concise Clear and concise

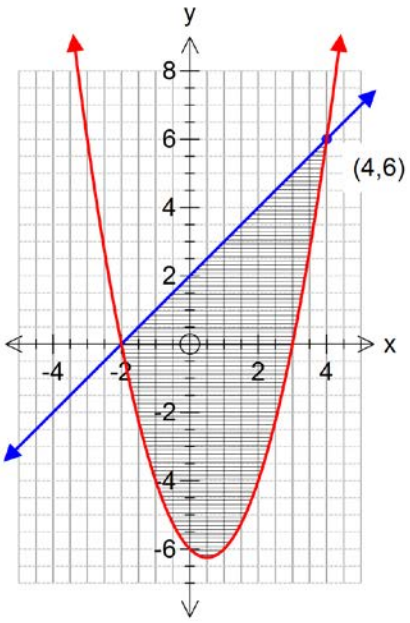
Part	Solutions to Question 2	Mks	Marking Criteria
(a)	$f(x)=x^3-4x^2+7x-10$ $f(-2)=(-2)^3-4(-2)^2+7x-10$ $=-8-1-14-10$ $=-48$	**1**	Correct answer
(b)	C: $-1\le x\le 3$	**1**	Correct answer
(c)	Domain: $3-2x>0$ $-2x>-3$ $x<\frac{3}{2}$	**2**	Correct answer
		1	Correct restriction statement Or Correct answer from incorrect restriction statement
(d)		**3**	Correct graph with all features shown
		2	Correct graph with y-intercept shown, no end points
		1	Correct graph, no y-intercept marked, no end points
(e)		**3**	Correct graph with asymptote and *x*-intercept indicated
		2	Correct graph either asymptote or x-intercept not shown
		1	Correct graph, no asymptote or *x*-intercept

(f) i)	$y = x^2 + 2x + 7$ Axis-of-symmetry: $x = \frac{-b}{2a}$ $x = \frac{-2}{2}$ $x = -1$	**1**	Correct answer
(f) ii)	$y = x^2 + 2x + 7$ $y = (-1)^2 + 2(-1) + 7$ $y = 6$ Vertex is (-1, 6).	**1**	Correct answer
	Communication for Question 2 **1 mark:** communicating how domain reached in (b) **1 mark:** stating that $2x - 3 > 0$ not ≥ 0 **1 mark:** showing graph in (d) had end points		

Part	Solutions to Question Three	Mks	Marking Criteria
(a) (i)	$f(0) = -2 \qquad F(6) = 6^2 + 1$ $= 37$ $f(0) + f(6) = -2 + 37$ $= 35$	**2**	Correct answer
		1	Correct attempt at solution with only one error.
(a) (ii)		**3**	Correct graph showing Correct *y* axis intercepts. A closed circle for $f(x) = -2$ and an open circle for start of $f(x) = x^2 + 1$. Either a second point shown on $f(x) = x^2 + 1$ or a very good scale drawn on both *x* and *y*-axis. A neat smooth sketch. Graphs should be labeled. Axes should be labeled.
		2	A very good attempt with one significant feature missing from points listed above
		1	A good attempt with two significant things missing from the list above above.
(b) (i)		**3**	Two correct graphs. Both x and y intercepts should be clear. Points of intersections should either be labeled or a very good scale drawn on both *x* and *y*-axis. Absolute graph should be symmetrical. Graphs should be labeled. Axes should be labeled.
		2	A very good attempt with one significant feature missing from points listed above

		1	A good attempt with two significant things missing from the list above above.
(b)(ii)	Algebraically, $-3 \le 2x-1 \le 3$ $-2 \le 2x \le 4$ $-1 \le x \le 2$ Solution can be read off the graph from part (i)	**2**	Correct solution
		1	Good attempt with one error
	Communication for Question 3 1 Mark: clear and logical setting out in part (a)(i) $f(0) = -2 \qquad F(6) = 6^2 + 1$ $= 37$ $f(0) + f(6) = -2 + 37$ $= 35$ 1 Mark: for part of the piece wise graph in part (a)(ii) $f(x) = x^2 + 1$ An extra point is clearly labeled or a very good scale is provided.		

Part	**Solutions to Question Four**	**Mks**	**Marking Criteria**
(a) (i)	$(x+2)(x-3) = x+2$ $x^2 - x - 6 = x - 2$ $x^2 - 2x - 8 = 0$ $(x+2)(x-4) = 0$ $x = -2,\ x = 4$ Sub each value to find y When $x = -2,\ y = 0$ When $x = 4,\ y = 6$ $\therefore$ points of interection are $(-2, 0)$ and $(4, 6)$	**2**	Correct solution showing working
		1	Two correct points, no working An incorrect equation resulting in 2 solutions

(a) (ii)		**2**	Correct sketch
		1	Correct parabola or correct line and incorrect parabola or correct graph with only one point of intersection
(a) (iii)	Regions, see above	**2**	Correct region
		1	One correct region
(b) (i) (ii) (iii) (iv)	Shift function down 3 units Reflect/flip function about the x-axis Shift function left 2 untis Make function twice as steep/narrow	**4**	One mark for each description
	Communication for question 4: Part b.		