



FINAL MARK

**GIRRAWEEEN HIGH SCHOOL
PRELIMINARY ASSESSMENT TASK 1
2008**

Name: _____ Teacher: _____

QUESTION	MARK	P2	P3	P4	P5	P6	P7	P8
Question 1			√	√				
Total	/8							
Question 2			√	√				
Total	/12							
Question 3				√				
Total	/14							
Question 4			√	√				
Total	/16							
Question 5			√	√				
Total	/15							
Question 6				√				
Total	/11							
Question 7			√	√	√			
Total	/14							
TOTAL	/90		/65	/90	/14			

Preliminary Learning Outcomes. Mathematics

- P2 provides reasoning to support conclusions which are appropriate to the context.
- P3 performs routine arithmetic and algebraic manipulations involving surds, simple rational expressions, and trigonometric identities.
- P4 chooses and applies appropriate arithmetic, algebraic, graphical, trigonometric, and geometric techniques.
- P5 understands the concept of a function and the relationship between a function and its graph.
- P6 relates the derivative of a function to the slope of its graph.
- P7 determines the derivative of a function through the routine application of the rules of differentiation.
- P8 understands and uses the language and notation of calculus.

Girraween High School
Year 11
Mathematics Task 1
Wednesday, March 12, 2008

- Instructions:
- a) Write all of your answers on your own paper.
 - b) Show all necessary working.
 - c) Marks may be deducted for careless or badly arranged work.

Time allowed: 90 minutes

Question 1

Marks

- a) Find the exact value of $\left(\frac{1}{2} + \frac{5}{3}\right) \times \frac{2}{3} \div \frac{7}{6}$ 2
- b) Calculate the value of $\sqrt[4]{1.6 \times 2.6}$ to 2 significant figures 1
- c) Solve for x : $\frac{3}{2}x + 5 = \frac{2}{3}$ 1
- d) Given that $b = \pi q^2 w$, find the value(s) of q to 2 decimal places when $b = 200$ and $w = 10$. 2
- e) Express $3.\dot{4}\dot{5}$ as a fraction in simplest form. 2

Question 2**Marks**

a) Simplify:

i) $(2\sqrt{3}) \cdot (-3\sqrt{5})$ 1

ii) $5\sqrt{48} - \sqrt{27} + 5\sqrt{3}$ 2

b) Express with a rational denominator and simplify:

i) $\frac{10\sqrt{3}}{3\sqrt{5}}$ 2

ii) $\frac{4}{2+\sqrt{5}} + \frac{1}{9+4\sqrt{5}}$ 2

iii) $\frac{6\sqrt{2}}{\sqrt{2}+\sqrt{3}}$ 2

c) Expand and simplify:

i) $\sqrt{5}(2+\sqrt{3})$ 1

ii) $(1+\sqrt{6}) \cdot (\sqrt{6}-\sqrt{2})$ 2

Question 3**Marks**

a) Expand and simplify:

i) $2(p-q) - 3(2p-q)$ 1

ii) $(4m^2 - 3n) \cdot (4m^2 + 3n)$ 1

iii) $(x-3) \cdot (x-4) \cdot (x+2)$ 2

Question 3 (continued)**Marks**

b) Factorise fully:

i) $-2xy^2 - 6x^3y$ 1

ii) $2m^2 - 2m - 84$ 2

iii) $3p^2 - 5p - 2$ 2

iv) $c^3 - 2c^2 + c - 2$ 2

v) $x^6 - 64$ 3

Question 4**Marks**

a) Simplify:

i) $\frac{2x}{3} - \frac{5x}{7}$ 1

ii) $\frac{4}{p} + \frac{2}{p-3}$ 2

iii) $\frac{3x}{x^2 + 5x + 6} - \frac{5}{x+3}$ 3

b) Simplify:

i) $\frac{w^2 - 2w - 8}{w^2 + w - 20}$ 2

ii) $\frac{b-a}{a^3 - b^3}$ 3

c) Simplify:

i) $\frac{x-4}{x^2-49} \times \frac{x^2+x-56}{x^3-4x^2}$ 2

ii) $\frac{p-2}{p-3} \div \frac{p^2-5p+6}{p-7}$ 3

Question 5**Marks**

a) Solve the following equations:

i) $(3m-1) \cdot (m+2) = 0$

1

ii) $4x^2 = -3x$

2

iii) $4k^2 - 15k = -9$

3

iv) $\frac{2x}{x+1} - \frac{x}{2} = 5$

3

b) Complete the square to solve (give the answer in surd form):

$$z^2 - z = 1$$

3

c) Use the quadratic formula to solve the equation:

$$5x^2 + 3x - 1 = 0$$

3

Question 6**Marks**

a) Solve each inequality, and graph your solution on the number line

i) $-2x \leq 7$

2

ii) $-8 \leq 7x - 1 < 13$

3

b) Solve the following simultaneous equations:

i) $2x + 3y = 28$

$-3x - 2y = -27$

3

ii) $2x - y - 5 = 0$

$y = x^2 - 4x + 3$

3

Question 7

Marks

a) Indicate whether each of the following relations is a **function** or **not a function**. State its domain.

i) $y = \frac{1}{x-5}$

1

ii) $x^2 + y^2 = 36$

2

iii) $y = -\sqrt{4-x}$

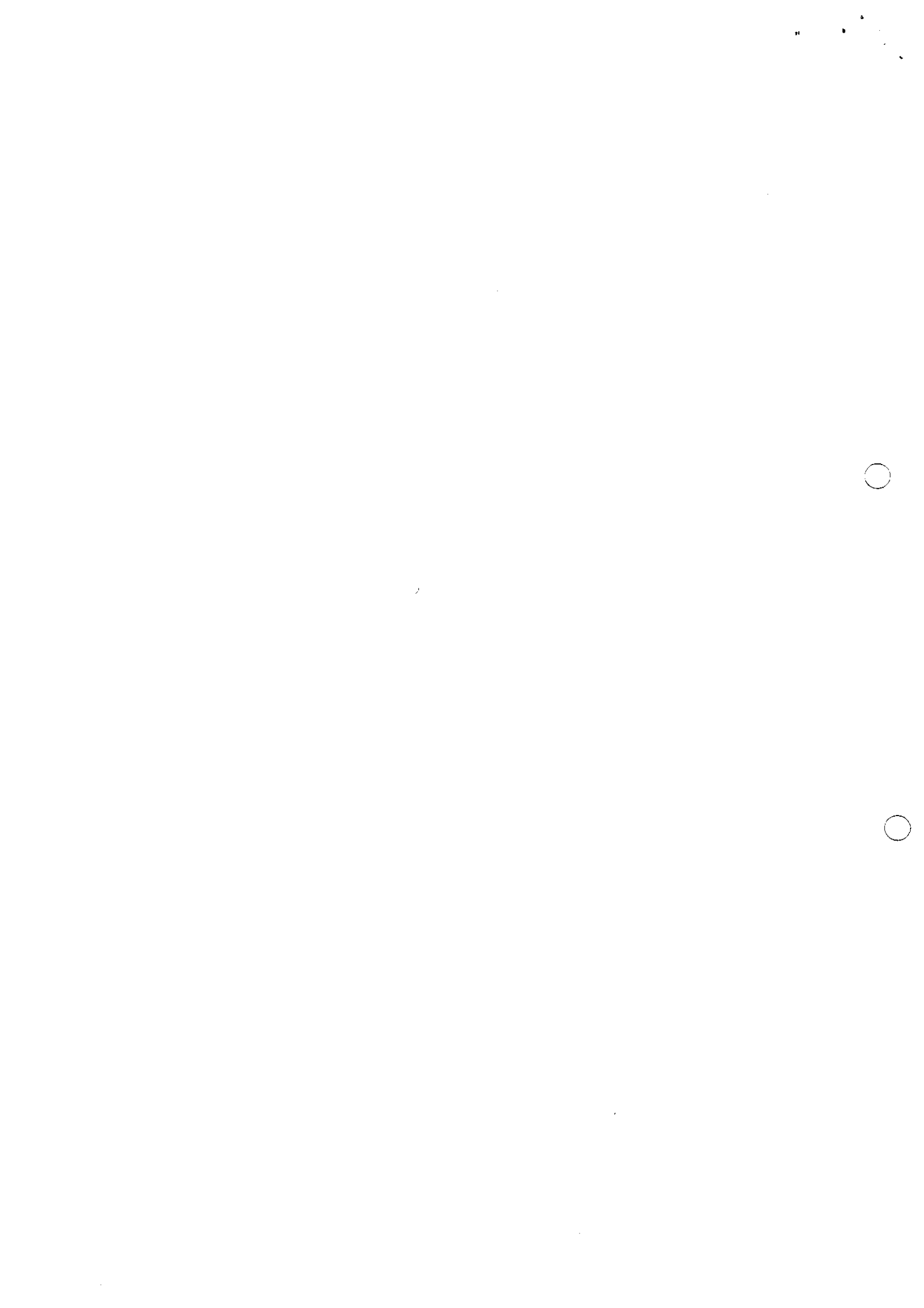
2

b) Graph the function $5x - 3y = 15$, including any intercepts.

3

c) Graph the function $y = x^2 + 4x - 5$, including the vertex and intercepts.

6



① a) $\left(\frac{1}{2} + \frac{5}{3}\right) \times \frac{2}{3} \div \frac{7}{6}$
 $= \left(\frac{3}{6} + \frac{10}{6}\right) \times \frac{2}{3} \times \frac{6}{7}$
 $= \frac{13}{6} \cdot \frac{2}{3} \cdot \frac{6}{7}$
 $= 26/21$

b) $\sqrt[4]{1.6 \times 2.6}$
 ≈ 1.428
 ≈ 1.4

c) $\frac{3}{2}x + 5 = \frac{2}{3}$
 $\frac{3}{2}x = \frac{2}{3} - 5$
 $x = \left(\frac{2-15}{3}\right) \cdot \frac{2}{3}$
 $= -26/9$

d) $b = \pi r^2 w$
 $r = \pm \sqrt{\frac{b}{\pi w}}$
 $= \pm \sqrt{\frac{200}{10\pi}}$
 $\approx \pm 2.52$

e) Let $x = 3.45^\circ$
 $\therefore 100x = 345.45^\circ$

 $99x = 342$
 $x = \frac{342}{99}$
 $= 38/11$

② a) i) $(2\sqrt{3})(-3\sqrt{5})$
 $= -6\sqrt{15}$
 ii) $5\sqrt{48} - \sqrt{27} + 5\sqrt{3}$
 $= 5 \cdot 4\sqrt{3} - 3\sqrt{3} + 5\sqrt{3}$
 $= 22\sqrt{3}$

② b) i) $\frac{10\sqrt{5}}{3\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}}$
 $= \frac{10\sqrt{5}}{15}$
 $= \frac{2\sqrt{5}}{3}$
 ii) $\frac{4}{2+\sqrt{5}} + \frac{1}{9+4\sqrt{5}}$
 $= \frac{4(2-\sqrt{5})}{(2+\sqrt{5})(2-\sqrt{5})} + \frac{1(9-4\sqrt{5})}{(9+4\sqrt{5})(9-4\sqrt{5})}$
 $= \frac{8-4\sqrt{5}}{4-5} + \frac{9-4\sqrt{5}}{81-80}$
 $= \frac{8-4\sqrt{5}}{-1} + \frac{9-4\sqrt{5}}{1}$
 $= 4\sqrt{5} - 8 + 9 - 4\sqrt{5}$
 $= 1$

iii) $\frac{6\sqrt{2}}{(\sqrt{2}+\sqrt{3})(\sqrt{2}-\sqrt{3})}$
 $= \frac{6\sqrt{4} - 6\sqrt{6}}{2-3}$
 $= \frac{12\sqrt{6} - 12}{-1}$

② c) i) $\sqrt{5}(2+\sqrt{3})$
 $= 2\sqrt{5} + \sqrt{15}$
 ii) $(1+\sqrt{6})(\sqrt{6}-\sqrt{2})$
 $= \sqrt{6} - \sqrt{2} + 6 - \sqrt{12}$
 $= \sqrt{6} - \sqrt{2} + 6 - 2\sqrt{3}$

③ a) i) $2(p-q) - 3(2p-q)$
 $= 2p - 2q - 6p + 3q$
 $= q - 4p$
 ii) $(4m^2 - 3n)(4m^2 + 3n)$
 $= 16m^4 - 9n^2$
 iii) $(x-3)(x-4)(x+2)$
 $= (x^2 - 7x + 12)(x+2)$
 $= x^3 + 2x^2 - 7x^2 - 14x + 12x + 24$
 $= x^3 - 5x^2 - 2x + 24$

③ b) i) $-2xy^2 - 6x^3y$
 $= -2xy(y + 3x^2)$

ii) $2m^2 - 2m - 84$
 $= 2(m^2 - m - 42)$
 $= 2(m-7)(m+6)$

iii) $3p^2 - 5p - 2$
 $= (3p+1)(p-2)$

iv) $c^3 - 2c^2 + c - 2$
 $= (c^3 - 2c^2) + (c-2)$
 $= c^2(c-2) + 1(c-2)$
 $= (c-2)(c^2+1)$

$$3) b) v) \cdot x^6 - 64$$

2 METHODS

· DIFF OF SQ. FIRST

$$\begin{aligned} & x^6 - 64 \\ &= (x^3 - 8)(x^3 + 8) \\ &= (x - 2)(x^2 + 2x + 4)(x + 2)(x^2 - 2x + 4) \end{aligned}$$

OR - DIFF OF CUBES FIRST.

$$\begin{aligned} & x^6 - 64 \\ &= (x^2 - 4)(x^4 + 4x^2 + 16) \\ &= (x + 2)(x - 2)[(x^4 + 8x^2 + 16) - 4x^2] \\ &= (x + 2)(x - 2)[(x^2 + 4)^2 - 4x^2] \\ &= (x + 2)(x - 2)(x^2 + 4 - 2x)(x^2 + 4 + 2x) \\ &= (x + 2)(x - 2)(x^2 - 2x + 4)(x^2 + 2x + 4) \end{aligned}$$

$$(4) a) i) \frac{2x}{3} - \frac{5x}{7}$$

$$= \frac{14x}{21} - \frac{15x}{21}$$

$$= -\frac{x}{21}$$

$$ii) \frac{4}{p} + \frac{2}{p-3}$$

$$= \frac{4(p-3) + 2p}{p(p-3)}$$

$$= \frac{6p-12}{p(p-3)}$$

$$iii) \frac{3x}{x^2+5x+6} - \frac{5}{x+3}$$

$$= \frac{3x}{(x+3)(x+2)} - \frac{5}{(x+3)(x+2)}$$

$$= \frac{3x-5x-10}{(x+3)(x+2)}$$

$$= \frac{-2x-10}{(x+3)(x+2)}$$

$$(4) b) i) \frac{w^2-2w-8}{w^2+w-20}$$

$$= \frac{(w-4)(w+2)}{(w-4)(w+5)}$$

$$= \frac{w+2}{w+5}$$

$$ii) \frac{b-a}{a^3-b^3}$$

$$= \frac{-(a-b)}{(a-b)(a^2+ab+b^2)}$$

$$= \frac{-1}{a^2+ab+b^2}$$

$$(4) c) i) \frac{x-4}{x^2-49} \cdot \frac{x^2+x-56}{x^3-4x^2}$$

$$= \frac{x-4}{(x+7)(x-7)} \cdot \frac{(x+8)(x-7)}{x^2(x-4)}$$

$$= \frac{x+8}{x^2(x+7)}$$

$$ii) \frac{p-2}{p-3} \div \frac{p^2-5p+6}{p-7}$$

$$= \frac{p-2}{p-3} \cdot \frac{p-7}{(p-2)(p-3)}$$

$$= \frac{p-7}{(p-3)^2}$$

$$(5) a) i) (3m-1)(m+2) = 0$$

$$m = \frac{1}{3} \quad m = -2$$

$$ii) 4x^2 = -3x$$

$$4x^2 + 3x = 0$$

$$x(4x+3) = 0$$

$$x = 0 \quad x = -\frac{3}{4}$$

$$iii) 4k^2 - 15k = -9$$

$$4k^2 - 15k + 9 = 0$$

$$\frac{(4k-12)(4k-3)}{4} = 0$$

$$(k-3)(4k-3) = 0$$

$$k = 3 \quad k = \frac{3}{4}$$

$$(5) a) iv) \frac{2x}{x+1} - \frac{x}{2} = 5$$

$$2x \cdot 2 - x(x+1) = 5 \cdot 2(x+1)$$

$$4x - x^2 - x = 10x + 10$$

$$x^2 + 7x + 10 = 0$$

$$(x+5)(x+2) = 0$$

$$x = -5 \quad x = -2$$

$$b) z^2 - 2 = 1$$

$$z^2 - 2 + \frac{1}{4} = 1 + \frac{1}{4}$$

$$(z - \frac{1}{2})^2 = \frac{5}{4}$$

$$z - \frac{1}{2} = \pm \sqrt{\frac{5}{4}}$$

$$z = \frac{1}{2} \pm \frac{\sqrt{5}}{2}$$

$$c) 5x^2 + 3x - 1 = 0$$

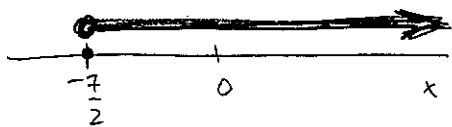
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-3 \pm \sqrt{9 - 4(5)(-1)}}{2 \cdot 5}$$

$$= \frac{-3 \pm \sqrt{29}}{10}$$

⑥ a) i) $-2x \leq 7$

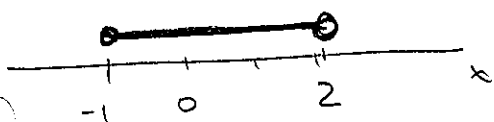
$x \geq \frac{-7}{2}$



ii) $-8 \leq 7x - 1 < 13$

$-7 \leq 7x < 14$

$-1 \leq x < 2$



b) i) $\begin{cases} 2x + 3y = 28 & \textcircled{1} \\ -3x - 2y = -27 & \textcircled{2} \end{cases}$

$6x + 9y = 84 \quad \textcircled{1} \times 3$

$-6x - 4y = -54 \quad \textcircled{2} \times 2$

$5y = 30$

$y = 6$

$2x + 3(6) = 28 \quad \rightarrow \textcircled{1}$

$2x = 10$

$x = 5 \quad \therefore (5, 6)$

ii) $\begin{cases} 2x - y - 5 = 0 & \textcircled{1} \\ y = x^2 - 4x + 3 & \textcircled{2} \end{cases}$

$2x - 5 = y \quad \textcircled{1}$

$2x - 5 = x^2 - 4x + 3$

$0 = x^2 - 6x + 8$

$0 = (x - 4)(x - 2)$

$x = 4$

$y = 2(4) - 5 = 3$

$\therefore (4, 3)$

$x = 2$

$y = 2(2) - 5 = -1$

$\therefore (2, -1)$

⑦ a) i) $\frac{1}{x-5} = y$ FUNCTION

D: $x \neq 5$

ii) $x^2 + y^2 = 36$ NOT A FUNCTION

D: $-6 \leq x \leq 6$

iii) $y = -\sqrt{4-x}$ FUNCTION

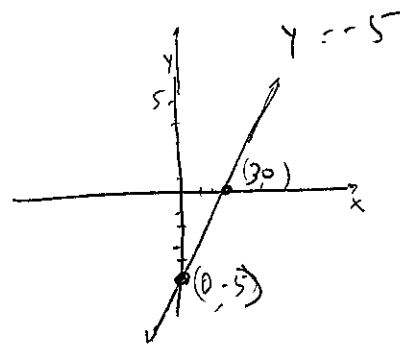
D: $x \leq 4$

b) $5x - 3y = 15$

X-INT $5x - 3(0) = 15$

$x = 3$

Y-INT $5(0) - 3y = 15$



c) $y = x^2 + 4x - 5$
 $= (x + 5)(x - 1)$

X-INTS $x = -5 \quad x = 1$

Y-INT $y = -5$

$V_x = \frac{-b}{2a} = \frac{-4}{2} = -2$

$V_y = (-2 + 5)(-2 - 1) = -9$

$\therefore V(-2, -9)$

