

Name: _____
Student ID: _____

Test 2

This test is graded out of 42 marks. No books, notes, graphing calculators or cell phones are allowed. You must show all your work, the correct answer is worth 1 mark the remaining marks are given for the work.

Question 1. Solve for x :

a. (3 marks)

$$\frac{4x+1}{2} - \frac{2x+3}{3} = \frac{5x-1}{4}$$

b. (6 marks)

$$\frac{x+4}{x^2-3x+2} - \frac{5}{x^2-4x+3} - \frac{x-4}{x^2-5x+6} = 0$$

Question 2. (4 marks) State the equation of the circle given the two endpoints of a diameter: $(-8, 2)$ and $(2, 4)$.

Question 3. (2 marks) State the domain and range of $f(x) = \sqrt{x-5}$.

Question 4. (5 marks) If $f(x) = \frac{x}{x+1}$ then find $\frac{f(x+h)-f(x)}{h}$.

Question 5. If $f(x) = \sqrt{2x-3}$ and $g(x) = 7x^2 - 2$ then find:

- a. (1 mark) $f\left(\frac{3}{2}\right)$
- b. (1 mark) the value of x if $f(x) = 3$.
- c. (1 mark) $5f(2) - 5g(2)$

Question 6. (4 marks) Sketch a graph of the function $f(x) = -2x - 4$ using the x and y intercepts. (clearly label the graph)

Question 7. (4 marks) Find the equation of the line that passes through the points: $(-3, 4)$ and $(7, -9)$.

Question 8. Let $f(x) = -3x^2 + 12x - 3$.

- a. (2 marks) Determine the vertex of $f(x)$.
- b. (1 mark) Determine the orientation of the parabola and state whether the vertex is a minimum or maximum.
- c. (1 mark) Determine the y -intercept.
- d. (1 mark) Determine the x -intercept(s).
- e. (1 mark) Sketch the graph of $f(x)$.
- f. (1 marks) Determine the domain and range of $f(x)$.

Question 9. (4 marks) Find the equation of the line through $(4, \frac{1}{2})$ and perpendicular to $2y + 4x - 14 = 0$

Bonus.

- a. (1 marks) The *rational root theorem* states that if the polynomial $p(x) = x^n + a_{n-1}x^{n-1} + \dots + a_1x + a_0$ has coefficients a_i that are all integers and $p(x)$ has a rational root r , then a_0 is divisible by r . Let $p(x) = x^3 + 4x^2 + x - 6$ then state the possible rational roots.
- b. (1 marks) The *factor theorem* states that if $p(r) = 0$ then $(x - r)$ is a factor of $p(x)$. Using the rational root theorem find all factors of $p(x)$.
- c. (1 mark) Factor $p(x)$.