

MHF4U Test #1: Chapters 1-3

Name: _____

Date: _____

Part A – Multiple Choice [K/U – 20 marks]

1. If the leading coefficient of an odd-degree polynomial function is negative, then the function extends from the second quadrant to the fourth quadrant; that is, as

- a. $x \rightarrow \infty, y \rightarrow -\infty$ and as $x \rightarrow -\infty, y \rightarrow \infty$
- b. $x \rightarrow -\infty, y \rightarrow \infty$ and as $x \rightarrow \infty, y \rightarrow \infty$
- c. $x \rightarrow -\infty, y \rightarrow -\infty$ and as $x \rightarrow \infty, y \rightarrow \infty$
- d. $x \rightarrow -\infty, y \rightarrow -\infty$ and as $x \rightarrow \infty, y \rightarrow -\infty$

2. Which polynomial function would have the end behaviour of as, $x \rightarrow \pm\infty, y \rightarrow -\infty$?

- a. $f(x) = 7x^5 - 8x^4 - 2x^3 + x^2 + 3x - 2$
- b. $f(x) = -4x^2 + 3x^4 - 6x^3 + 2x + 8$
- c. $f(x) = -6x^3 + 3x^2 + x - 11$
- d. $f(x) = -x^2 - 2$

3. The degree of the polynomial function $y = (x-1)^3(x+1)^2$ is

- a. 3
- b. 4
- c. 5
- d. 6

4. Given a function $f(x)$ with the function values $f(1) = 0$, $f(2) = 64$, $f(-1) = -24$, and $f(0) = -20$, which value of x is a factor of the function?

- a. $x = -1$
- b. $x = 2$
- c. $x = 1$
- d. $x = 0$

5. The function $y = 6(x-1)^4(x-2)(x+1)^2$ changes sign at

- a. $x = 1$
- b. $x = 2$
- c. $x = -1$
- d. it doesn't change sign

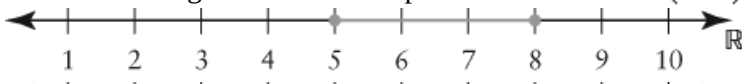
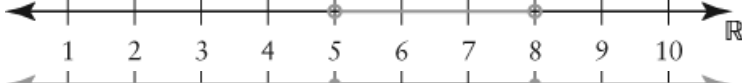
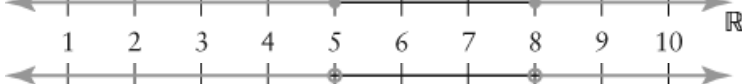
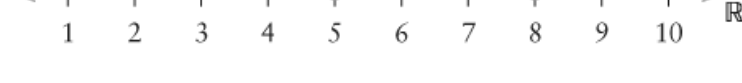
6. Which is the best list of possible values of x that could make $f(x) = 3x^3 + 6x^2 + 11x + 6$ equal to 0?

- a. $\pm 1, \pm 2, \pm 3, \pm 6$
- b. $\pm 1, \pm 2, \pm \frac{3}{2}, \pm \frac{1}{2}, \pm \frac{1}{3}$
- c. $\pm 1, \pm 2, \pm 3, \pm 6, \pm \frac{1}{3}, \pm \frac{2}{3}$
- d. $0, \pm 1, \pm 2, \pm \frac{3}{2}, \pm \frac{1}{2}, \pm \frac{1}{3}, \pm \frac{2}{3}$

7. $6x^4 - 2x^3 - 21x^2 + 7x + 8$ is divided by $3x - 1$ to give a quotient of $2x^3 - 7x$ and a remainder of 8, then which of the following is true?

- a. $\frac{6x^4 - 2x^3 - 21x^2 + 7x + 8}{3x - 1} = 2x^3 - 7x + \frac{8}{3x - 1}$
- b. $6x^4 - 2x^3 - 21x^2 + 7x + 8 = (3x - 1)(2x^3 - 7x) - 8$
- c. $x \neq -\frac{1}{3}$
- d. all of the above

8. Which of the following number lines depicts the solution to $-(x-5)(x-8) > 0$?

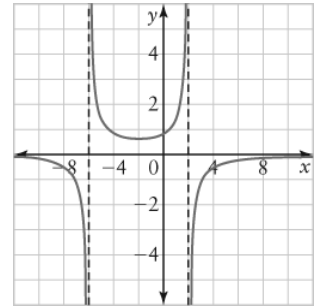
- a. 
- b. 
- c. 
- d. 

9. The graph of which of the following rational functions has a hole?

- a. $y = \frac{2x-6}{x-6}$ b. $y = \frac{2x-3}{x-3}$ c. $y = \frac{2x-6}{2x}$ d. $y = \frac{2x-6}{x-3}$

10. Over what interval does the graph of the rational function have positive, decreasing slope?

- a. $x < -6$ b. $-6 < x < -2$ c. $-2 < x < 2$ d. $x > 2$



Show all work from this point forward for full marks.

11. Solve the following. ✓✓✓ & ✓✓✓✓

a) $x^4 - 13x^2 = -36$

b) $\frac{1}{x-2} + \frac{x-1}{x^2-4} = \frac{x+4}{x+2}$

12. Determine the average rate of change of the function $f(x) = -\frac{3}{x^2-2x}$ over the interval $[-1, \frac{1}{3}]$? ✓✓✓✓

Part B – Thinking and Investigation [TI – 20 marks]

1. Determine the approximate slope of the tangent to the curve $f(x) = \frac{2x-1}{x+2}$ at $x = -3$, to 1 decimal place. ✓✓✓✓

2. The solutions of the equation $4 = x + \frac{8}{x+m}$ are $x = 3$ and $x = -4$. Determine the value of m . ✓✓✓✓✓

3. When $ax^3 - 2x^2 + bx - 4$ is divided by $(x + 2)$, the remainder is 4. When it is divided by $(x - 1)$, the remainder is -11 . Find the values of a and b .? ✓✓✓✓✓✓

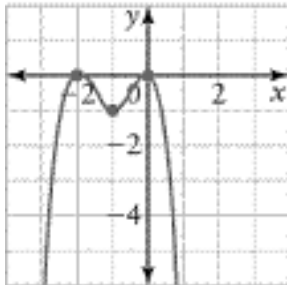
4. Solve the following inequalities using an algebraic method. ✓✓✓✓✓

$$\frac{-2x+5}{x+6} > -2$$

Part C – Communication [COMM – 20 marks]

*****Fully label your graphs for full marks!*****

1. Determine an equation for the graph of the polynomial function shown. ✓✓



2. Determine whether the function $y = -x^5 + x^3 - 1$ is even, odd, or neither. **Justify your answer.** ✓✓✓

3. Write a quadratic **inequality** with the solution: $-\frac{15}{2} \leq x \leq 1$. ✓✓✓

4. Consider the function. $f(x) = -\frac{1}{x^2+x-6}$

a) Determine the key features of the function:

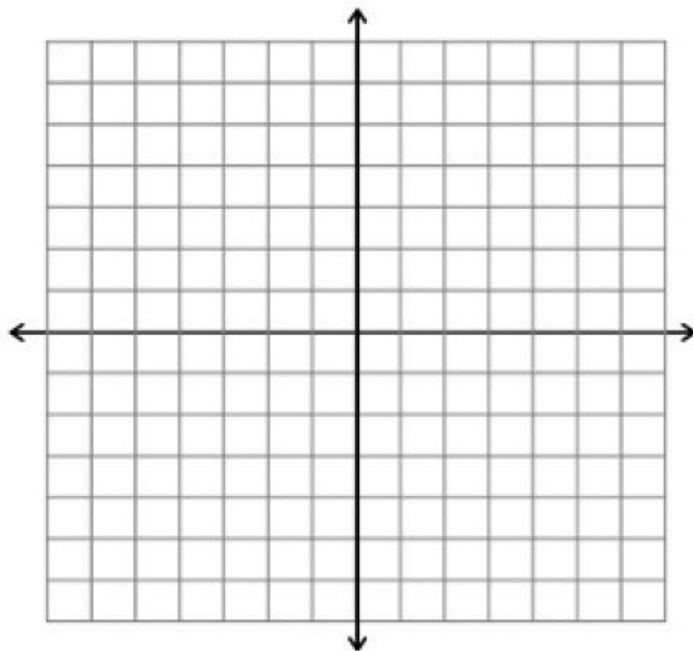
i) domain and range ✓✓

ii) intercepts ✓✓

iii) equations of any asymptotes ✓✓

iv) intervals where the function is increasing and intervals where the function is decreasing ✓✓

b) Sketch a graph of the function. ✓✓✓✓



Part D – Application [APP – 12 marks]

1. Joe's average running speed is 0.5 km/h greater than Bob's average running speed. In a 5-km practice race for a marathon, Bob finished 2 min behind Joe. Determine the average running speed of each person. ✓✓✓✓

2. a) Use long division to divide $-x^3 - 2x - 1$ by $x - 1$. Express the result in quotient form. ✓✓✓
b) Write the corresponding statement that can be used to check the division. ✓

2. A box is made such that the height is 2 cm longer than the width and the length is twice the width. The volume of the box is 576 cm^3 . Determine the dimensions of the box. ✓✓✓✓

Test Summary

Knowledge & Understanding	Thinking & Invest.	Communication	Application
/20	/20	/20	/12