**MHF4U UNIT TEST 1 – POLYNOMIAL AND RATIONAL FUNCTIONS.**

**Overall Expectations :**

**1.** identify and describe some key features of polynomial functions, and make connections between the

numeric, graphical, and algebraic representations of polynomial functions;

**2.** identify and describe some key features of the graphs of rational functions, and represent rational

functions graphically;

**3.** solve problems involving polynomial and simple rational equations graphically and algebraically;

**4.** demonstrate an understanding of solving polynomial and simple rational inequalities.

**Knowledge**

1. Use factorising to graph the polynomial f(x)= x⁴ - x³ - 7x² + x + 6. Show all intercepts.
2. Solve the inequality algebraically : -4x² – 4 < - 90
3. Suggest a possible equation for the function below.
4. Determine if f(x) = x² -4 is odd, even, or neither.
5. Describe the domain, range, and end behaviour of f(x) =

**Thinking /Inquiry**

1. Explain *why* solving the denominator in the rational function will find you the vertical asymptote. [ 3 ]
2. Why does a result of f (x ) = 0 derive a factor of a polynomial ?
3. How do you know f(x) = 2x² - 2 and g(x) = -3 (x +1 ) ( x – 1 ) are in the same family ?

**Communication**

1. Sketch the rational function f(x) = ( 3 – x )/ (2x – 3)
2. Show graphically the regions that are defined by f(x) < 0 if f(x) = x³ +2x² –x-2
3. Graph the rational function f(x) = ( x² - 3x – 10)/ 2x - 10 ) and show the discontinuity.

**Application**

1. A projectiles flight is mapped with the equation h = - 2t² +19t + 2. Calculate :
2. The average rate of change between 1 and 2 seconds.
3. The instantaneous rate of change at 1 second.
4. The volume of a box is given with the equation V = 4x³ -44x² + 120. Calculate :
5. The dimensions of the box if volume is to be maximised.
6. The length and width, if height = x.
7. An average profit function is mapped with AP(x) = [ R(x) – C(x) ]/ x

If R(x) = 2x² + 3x + 1 and C (x) = x ² + x + 0.5

Derive a rational function for AP(x)