Name: _____ Date: _____

MHF4U
Test – Unit 2: Polynomial Functions

Answer all questions on this paper. Be sure to show all **applicable** work and express all answers
in simplest form. Marks are awarded for presentation and technical correctness.

Knowledge/Understanding

1. State the degree, leading coefficient and end behaviours of
   $f(x) = x(3x - 4)(-2x + 1)(x - 5)$. (3 marks)

2. What is the maximum number of turning points of a function with a degree
   of 7? (1 mark)
   _____

3. What is the minimum number of turning points of a function with a degree of
   6? (1 mark)
   _____

4. A cubic polynomial has one zero and a negative leading coefficient. Draw a
   possible sketch of the graph. (2 marks)

5. State the remainder when $x - 5$ is divided into the polynomial
   $3x^3 - 8x^2 + 6x - 10$. (2 marks)

6. Factor

a) $64x^6 + 8$. (2 marks)

b) $(2x-5)^3 - (x+2)^3$ (3 marks)

7. Factor $f(x) = x^4 + 4x^3 - 119x^2 - 246x + 2376$ fully. (6 marks)

9. Determine the value of r, to make the multiplication statement $(2x+6)(x-7) + r = 2x^2 - 8x - 34$. (3 marks)

Thinking / Inquiry / Problem Solving

10. Determine the cubic equation with zeroes at -8, -4 and 13, if $f(-10) = -138$. Justify your answer. Show all work. (4 marks)

11. When $ax^3 - x^2 + 3x + b$ is divided by $x - 2$, the remainder is 59. When it is divided by $x + 1$ the remainder is -1. Find the value of a and b. (6 marks)

Application

12. The volume of a rectangular animal pen is $(x^3 - 7x - 6)\,\text{m}^3$. The pen is $(x + 1)\,\text{m}$ long. How wide and tall is the garden? (5 marks)

13. The actual and project profit and loses of a company during a twelve year period is shown in the table below.

Year	Profit/Loss (thousands of dollars)
2005	-80
2006	0
2007	48
2008	70
2009	72
2010	60
2011	40
2012	18
2013	0
2014	-8
2015	0
2016	88

a) Sketch a graph of the data, using the *years since 2005* as the values of the independent variable. (3 marks)

b) If x represents the number of years since 2005 (with 2005 being year 0), write the polynomial function that models the data. (3 marks)

c) Explain the trends in profit and loss of the company. (3 marks)

Communication

14. Determine the parent function and equation of the transformed function of the graph given. Justify your answer. (5 marks)