



Name: _____ Date : _____

IM 3 UNIT 4 TEST V1 - Polynomial Functions
Teacher: Mr. Santowski and Mr. Smith

Score: _____

PART 1 - CALCULATOR ACTIVE QUESTIONS

1. Given the polynomial $y = x^4 - 2x^3 - 8x^2 + 2x + 2$, use the TI-84 to produce a graph of the function.

(10 marks)

a. State an appropriate window setting, such that all zeroes and extrema (max/mins) are clearly visible.

b. Use your TI-84 to determine the zeroes of this quartic polynomial. Round your zeroes to 2 decimal places.

| | |
|------|-------|
| Xmin | _____ |
| Xmax | _____ |
| Ymin | _____ |
| Ymax | _____ |

(2)

(2)

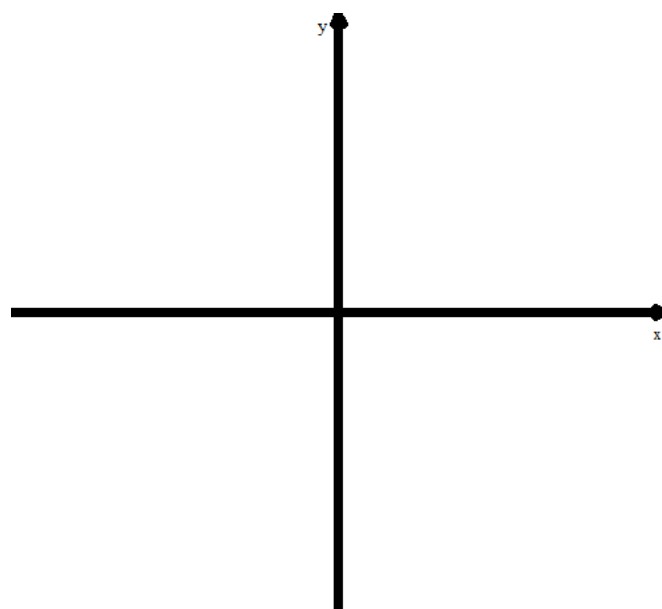
c. Using your answer from (b), write the equation in factored form.

d. Sketch the polynomial on the provided grid.

(2)

(2)

e. Use your TI-84 to determine the co-ordinates of the ABSOLUTE MINIMUM (lowest point) of this polynomial (rounded to 2 decimal places)



(2)

2. Here are two data sets showing the incidence of lung cancer in Canadians (expressed as a number per every 100,000 people)

(9 marks)

a. Determine a cubic equation for the incidence of lung cancer in the Canadian **FEMALE** population. Write your equation here (round each number to 3 sig figs).

b. Do both a CubicReg and QuartReg for the **MALE'S** data. Explain which model seems more appropriate and why. (DO NOT RECORD THESE EQNs on your test)

(2)

(3)

c. According to your models, when will the incidence of lung cancer in females be GREATER than that of the male population?

d. Give two plausible reasons as to why the incidence of lung cancer in females is rising in the 25 years of this study.

(2)

(2)

| <u>Year</u> | 1975 | 1980 | 1985 | 1990 | 1995 | 2000 |
|----------------|------|------|------|------|------|------|
| <u>Females</u> | 15 | 22 | 31 | 28 | 41 | 49 |
| <u>Males</u> | 73 | 83 | 93 | 91 | 85 | 79 |

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3. The polynomial $g(x) = x^5 - 9x^4 + 27x^3 - 27x^2$ can be viewed in a standard view window (ZOOM 6) on your TI-84, **(6 marks)**

a. Determine the zeroes of $y = g(x)$ and state their multiplicities. Explain how you determined the multiplicities. (HINT: it may help to make some WINDOW re-adjustments on your TI-84 and using your DATA TABLE!!)

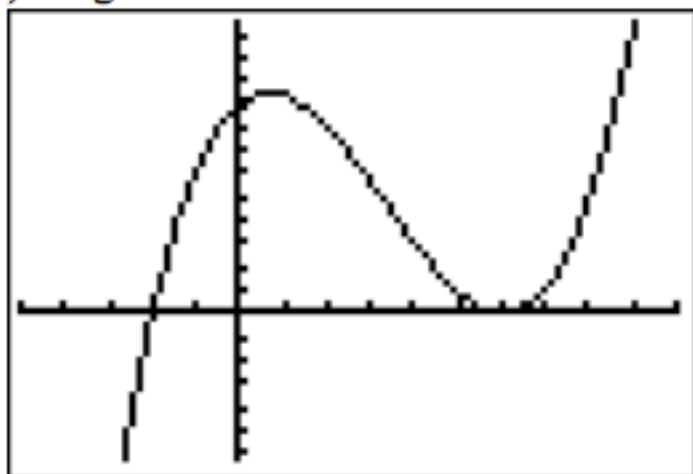
(4)

b. Write the equation of the polynomial in factored form.

(2)

4. The following graph was taken from Mr. S's TI-84 (where the x-scale and y-scales were each 1), write the function in factored and standard form. Show your working/reasoning in your solution.

(6 marks)



PART 2 - CALCULATOR INACTIVE QUESTIONS

1. Below is a sketch of a polynomial. Determine:

(8 marks)

a. The multiplicities of each zero.

(2)

b. The degree of the polynomial.

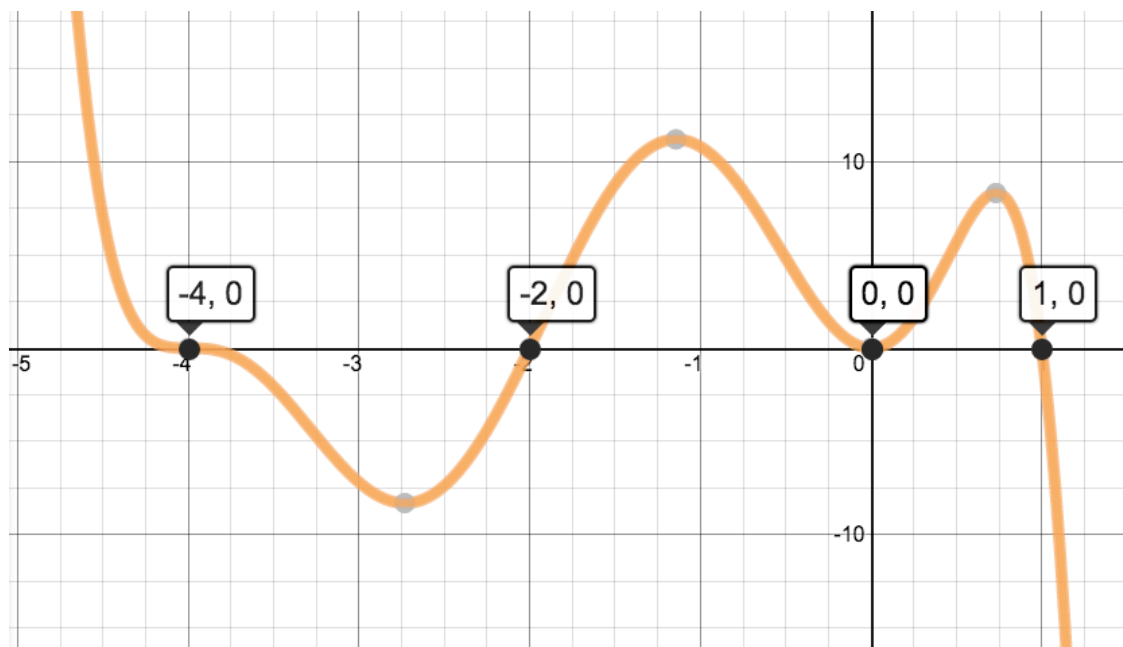
(1)

c. The sign of the leading coefficient.

(1)

d. Write a possible equation of this polynomial in factored form.

(4)



2. Here is an equation of a polynomial: $f(x) = \frac{1}{2}(x - 4)^2(x - 2)^3(x + 1)(1 - x)$.

(8 marks)

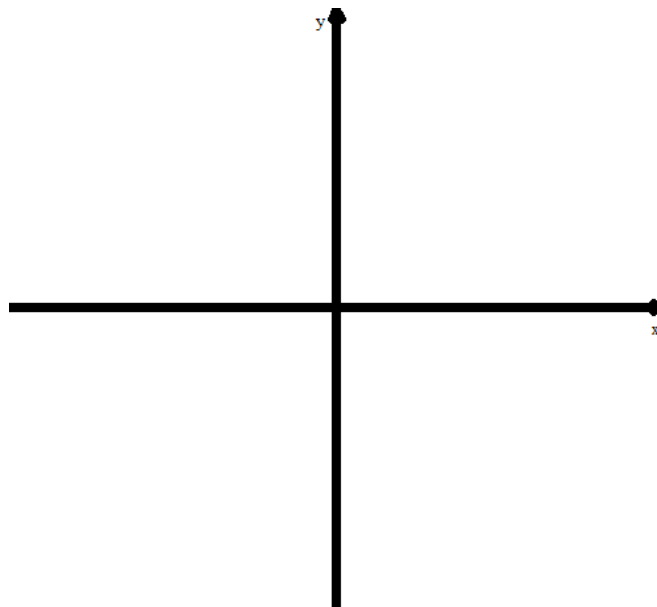
a. Determine the leading coefficient. (2)

b. State the degree of the polynomial. (1)

c. Determine the value of the y-intercept. (2)

d. Sketch $f(x)$

(3)



3. The rational function, $R(x)$, has a vertical asymptote at $x = -1/2$ and a horizontal asymptote at $y = -4$. Write a possible equation for $R(x)$.

(3 marks)

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4. Given the polynomial $Q(x) = x^3 + 11x^2 - x^4 - 9x - 18$, answer the following questions. Show/explain the thinking or working that leads to your answers.

(5 marks)

a. Is $x - 1$ a factor of this polynomial?

b. Is 3 a zero of this polynomial?

(2)

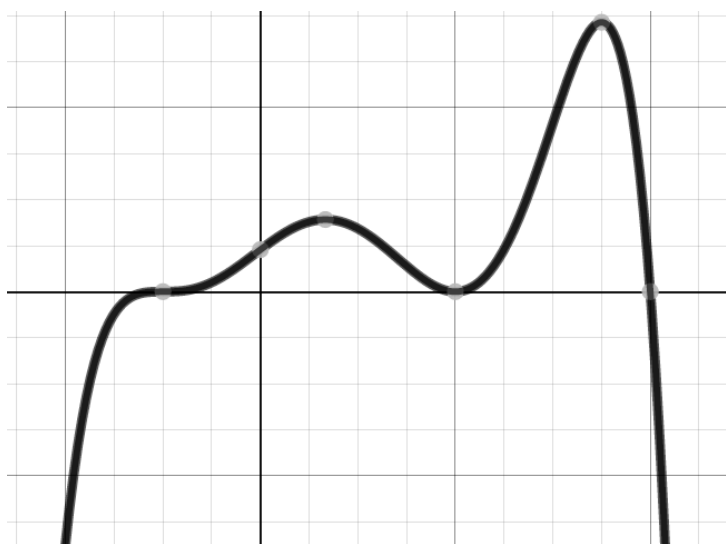
(2)

c. What is the end behaviour of this polynomial?

(1)

5. Give three plausible reasons why the graph below cannot possibly be the graph of $p(x) = x^4 + x^2 - 2$.

(3 marks)



6. Given the rational function $f(x) = \frac{-3x + 6}{2x - 3}$, determine:

(6 marks)

a. the equations of the vertical and horizontal asymptotes.

b. the domain and range of $f(x)$

(2)

(2)

c. the x- and y-intercepts of $f(x)$

(2)

7. Knowing that $x = -4$ is an x-intercept of the cubic function $p(x) = 2x^3 + 11x^2 + 10x - 8$, fully factor the polynomial. Once factored, state the values of the zeroes of $p(x)$.

(7 marks)

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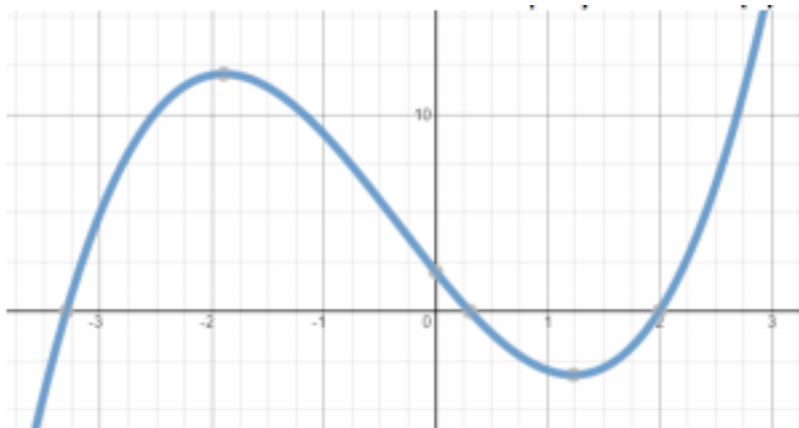
8. The polynomial $P(x) = 2x^3 - 3x^2 - 5x + 6$ factors completely into three linear factors: $P(x) = (2x + A)(x + B)(x + C)$. Factor $P(x)$ into its three linear factors.

(8 marks)

9. Here is a graph of the cubic function, $y = x^3 + x^2 - 7x + 2$.

(6 marks)

- a. State the exact value of one zero of the cubic. (1)
b. Determine the value of the other zeroes. (non-factorable, use QF to find the other two zeroes?) (5)



- a. This equation can be written in factored form as $g(x) = (x - A)(x^2 + Bx + C)$. Use your graph and answers from Q1a to determine the values of A, B and C. (3)