

Name _____

Class block _____

October 29, 2002

Honors Pre-Calculus Test

Sections 2.1–2.4

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Part A (25%) _____
Part B (30%) _____
Part C (45%) _____
overall _____

Write complete, fully explained solutions. If you use your graphing calculator for a significant step, tell what you did on the calculator.

Part A. Quadratic functions

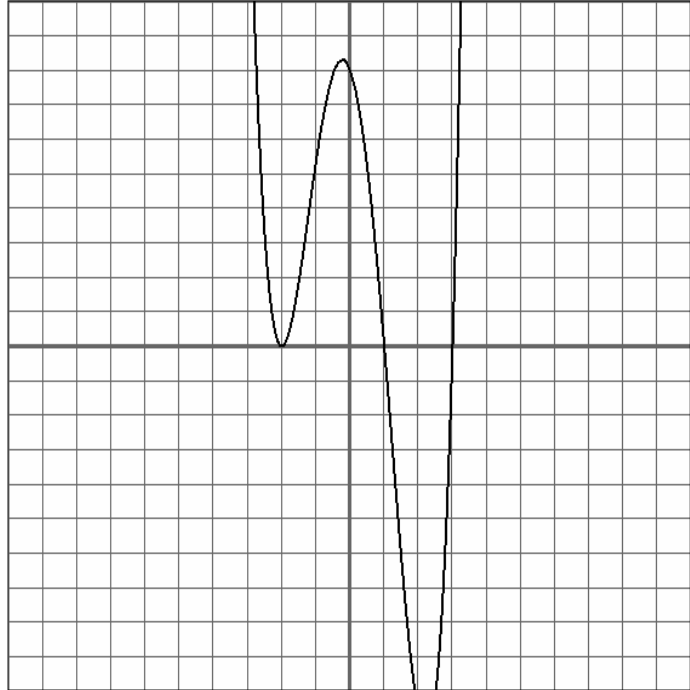
Your answer to question 1 must be justified algebraically. Unsupported conjectures will receive no credit.

1. Find the dimensions of the rectangle of perimeter 25 cm, having maximal area.

2. Show a sequence of algebraic steps that transforms the equation $y = -3(x - 2)(x - 5)$ into vertex form. Then, draw a conclusion about the coordinates of the vertex.

Part B. Polynomial functions and their graphs

3. Find the equation of the polynomial $Q(x)$ of degree 4 whose graph is shown.
The intercepts are $Q(-2) = 0$, $Q(0) = 8$, $Q(1) = 0$, and $Q(3) = 0$.



4. Suppose that $C(x)$ is a cubic function and $L(x)$ is a linear function.
Prove that the graphs of $C(x)$ and $L(x)$ must intersect at least once.

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Part C. Polynomial division, factors, and zeroes

5. a. Divide $\frac{2x^3 - 5x^2 + 6}{x^2 - 4}$.

b. Using only addition and multiplication, write an equation that relates the dividend, divisor, quotient, and remainder of this division problem.

6. What is the remainder when polynomial $P(x)$ is divided by $(x - c)$? Prove your answer.

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7. Let $f(x) = 3x^4 - 4x^3 + 6x^2 - 23x + 20$.

a. List the possible rational zeroes of $f(x)$, according to the Rational Zeroes Theorem.

b. Find a rational number that is a zero of $f(x)$.

c. Prove that $f(x)$ has an irrational zero between $x = 1$ and $x = 2$.
(You must prove the existence of this zero, and prove that it is irrational.)