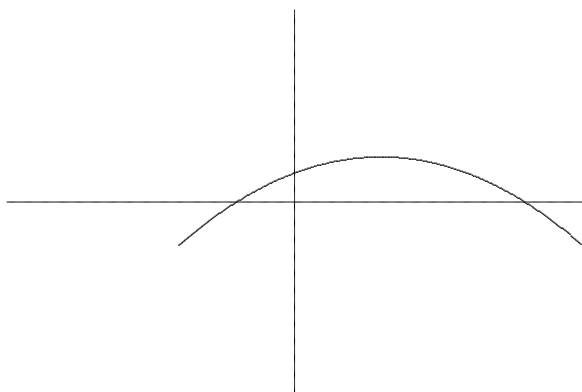


November 15, 2001

Your name _____

The first 6 problems count 7 points each and the final ones counts as marked. Problems 1 through 6 are multiple choice. In the multiple choice section, circle the correct choice (or choices). You do not need to show your work on multiple choice items. You must show your work on the other problems. The total number of points available is 124.

1. What is the remainder when $x^3 - 4x^2 + 5x - 6$ is divided by $x - 2$?
(A) -4 (B) -2 (C) 0 (D) 2 (E) 4
2. The function f shown below is a quadratic polynomial with zeros $x = -1$ and $x = 4$ and a y -intercept 1. What is the value of $f(2)$?
(A) 1 (B) $3/2$ (C) 2 (D) $5/2$ (E) 3



3. What is the degree of the polynomial $(x^2 + 1)^4(x + 2)^3$?
(A) 8 (B) 9 (C) 10 (D) 11 (E) 12
4. When the polynomial $(2x + 1)^2(3x + 2)^2(4x + 3)^2$ is written in standard form, what is the coefficient a_6 of the x^6 term?
(A) 36 (B) 144 (C) 288 (D) 576 (E) 1024
5. Referring again to the same polynomial, what is the constant term a_0 ?
(A) 1 (B) 4 (C) 9 (D) 16 (E) 36

6. What is the sum of the x -intercepts of

$$(x - 2)^3(2x + 7)^4 - (x - 2)^4(2x + 7)^3 = 0?$$

- (A) $-21/2$ (B) $-3/2$ (C) $-1/2$ (D) 0 (E) $9/2$

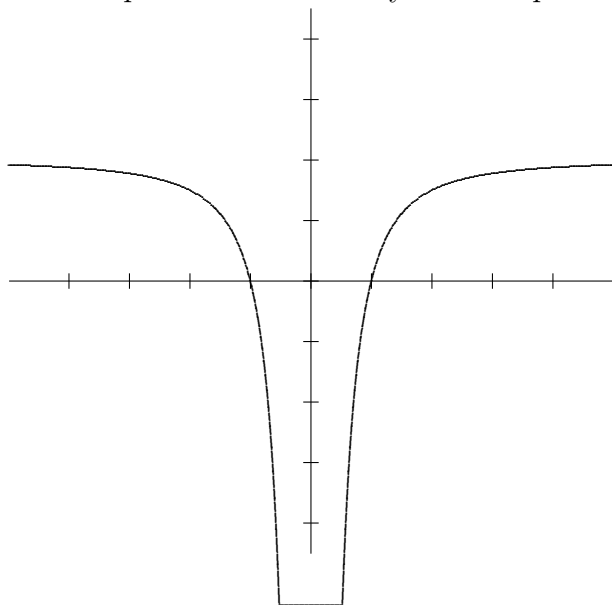
On all the following questions, **show your work.**

7. (12 points) Find five simple functions a, b, c, d , and e such that the composite function $a \circ b \circ c \circ d \circ e(x) = \sqrt{3x^2 - 6} + 7$.

8. (15 points) Find the vertex of the parabola $f(x) = 3x^2 - 6x + 21$ by completing the square. Explain why $f(x)$ is smaller at its vertex than any other point of its domain.

9. (20 points) Find the x -intercepts of the function $f(x) = x^3 - 7x^2 + 11x - 5$.

10. (15 points) The rational function $r(x)$ has asymptotes $y = 2$ and $x = 0$. It has x -intercepts at ± 1 . Find a symbolic representation of $r(x)$.



11. (20 points) Suppose the demand equation for WIDGETS is given by $x = -5p + 100$, $0 \leq p \leq 20$ where p is the price in dollars and x is the number of Widgets sold.

(a) Solve the demand equation for p and use the result to express the revenue function R as a function of x .

(b) What is the revenue if 15 units are sold?

(c) Find the vertex of $R(x)$.