Spring, 1999
Peterson

MATH 124.

HOMEWORK 7.

DUE: Friday, March 12.

P1. Refer to Group Project 3, in which we wanted to construct a rectangular box with a top in such a way that its volume was 22500 cubic inches and the length of its base was twice the width of its base. Find the dimensions of the box of this type that has the smallest surface area.

P2. A rectangular box with no top is to be constructed in such a way that the length of the base of the box is three times its width, and the surface area of the box is to be 900 square inches. Find the dimensions of the box if its volume is to be largest possible.

Note on P1 and P2: Of course we will be creating coherent write-ups for P1 and P2, and it would not even occur to us to fail to list a viewing window for a function we are maximizing or minimizing for either of these problems.

P3. Find the quadratic function whose graph passes through the points $(1\,,\,2)$, $(7\,,\,40)$, and $(-3\,,\,-10)$. Do this algebraically by solving as system of equations. Then explain briefly how you might verify your answer electronically.

P4. Do the indicated polynomial division. Then write your answer below your work in quotient-plus-remainder-divided-by-divisor form. (If your remainder is 0, your answer is simply the quotient.)

(1) $(x^4 - 5x^3 + 4x^2 - 7x + 2) \div (x^2 - x + 3)$.

(2) $(x^3 - 3x^2 + 6x - 1) \div (x^2 + 4)$.

(3) $(x^4 - 4x^2 + 5x - 3) \div (x - 2)$.

(4) $(2x^4 + 5x^3 - 5x^2 - 3x + 9) \div (x + 3)$.

P5. Consider the polynomial $P(x) = x^3 - 3x^2 - 50$.

(1) By examining the graph of $y_1 = P(x)$, find a solution to $P(x) = 0$.

(2) Use your solution in (1) and polynomial division to factor $P(x)$ as a product of a linear factor and a quadratic factor.

(3) Use your factorization in (2) to find all real/complex solutions to $P(x) = 0$.