Math 100 Exam III

7:30pm–8:30pm, Tuesday November 6, 2001

Recitation Instructor:_____

Recitation Day/Time:_____ **Name:**_____

No books or notes are allowed. Please read the problems carefully and do **all** you are asked to do. **You must show your work!** Use back pages as scratch paper. Do problems at spaces provided.

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1. For the quadratic function $f(x) = 2x^2 + 8x + 7$

(a) determine the vertex of the parabola;

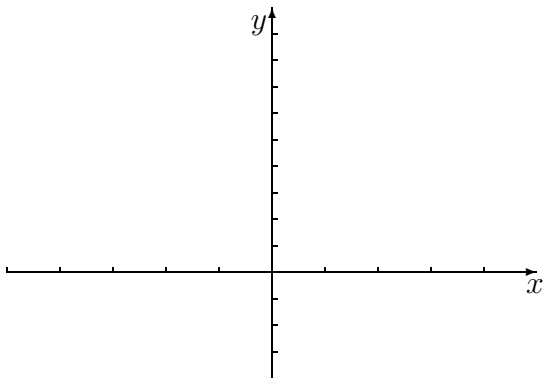
(b) determine all x-intercepts (with exact values).

2. Graph the function $f(x) = x^4 - 5x^2 + 4$ with the following steps:

(a) (3pts) Find all zeros of the function.

(b). (3pts) Plot the following points.

x	-2.5	-1.5	0	1.5	2.5
$f(x)$					



(c) (4pts) Graph the function to indicate the properties in (a) and (b) and the left-hand and right-hand behavior.

3. (a) (6pts) Use long division to find the quotient and remainder when $2x^4 - 4x^3 - 5x^2 + 3x - 2$ is divided by $x^2 - 2x - 3$.

(b) (4pts) Use result in (a) to write the improper fraction as a sum of a polynomial and a proper fraction.

$$\frac{2x^4 - 4x^3 - 5x^2 + 3x - 2}{x^2 - 2x - 3} =$$

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4. (10pts) For the polynomial $f(x) = x^4 - x^3 + x^2 - 3x - 6$,
(a). list all possible rational zeros using the rational zero test and find all rational zeros;

(b). find all remaining zeros (in addition to those in (a)) of $f(x)$ including complex zeros.

5. (10pts) For each of the following functions, find its domain and all vertical, horizontal, and slant asymptotes (write down their equations).

(a). $f(x) = \dfrac{5}{(x-3)^3}$ domain v. asymp. h. asymp. slant asymp.

(b). $f(x) = \dfrac{x^2 - 2x}{x+1}$

6. (10pts) Graph the function $f(x) = \dfrac{2(x^2-9)}{x^2-4}$ and provide the following information:

(a). y-intercepts:_____

(b). x-intercepts:_____

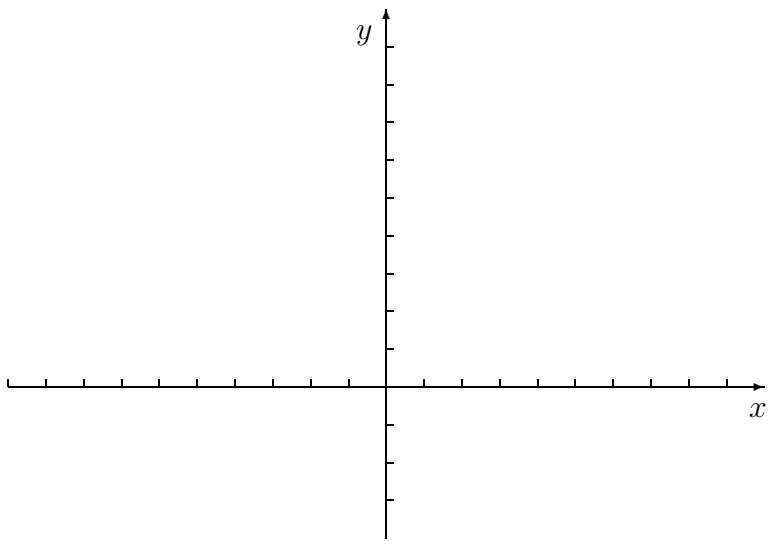
(c). Vertical asymptotes:_____

(d). Horizontal asymptotes:_____

(e). Symmetry:_____

(e). Values of the function:

x	0.5	1.5	2.5	7
$f(x)$				



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7. (10pts) Write the partial fraction decomposition for $\dfrac{x+7}{x^2-x-6}$.

8. (10pts) Find the number of units sold that produces a maximum revenue $R = 900x - 0.1x^2$, where R is the total revenue (in British Pounds) and x is the number of units sold.

9. (10pts) Convert the logarithm equation to an equivalent exponential equation, and vice versa.
(a). $\log_{32}(4) = \frac{2}{5}$, the equivalent exponential equation is

(b). $9^{\frac{3}{2}} = 27$, the equivalent logarithm equation is

10 (10pts) Given that $x^2 + 4$ is a factor, factor the polynomial $x^4 - 3x^3 - x^2 - 12x - 20$ in completely factored form using complex coefficients if necessary.

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