Name ______________________________ Rec. Instr. ____________________

Rec. Time ____________________

COLLEGE ALGEBRA

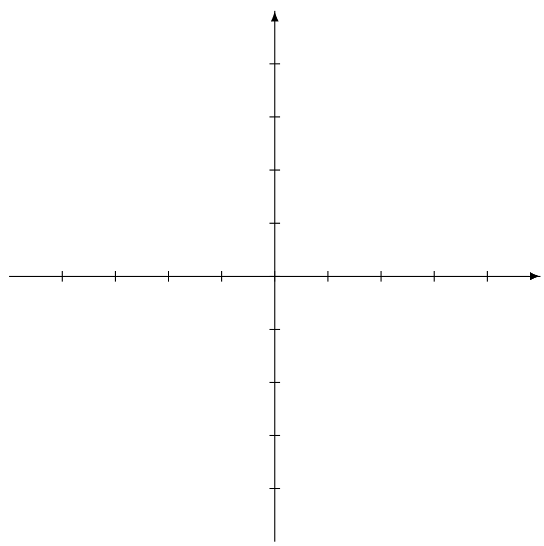
Exam III
November 7, 2006

Page 1 (20 pts.)	**Page 2** (25 pts.)	**Page 3** (30 pts.)	**Page 4** (25 pts.)	**TOTAL** (100 pts.)

Below you will find 9 problems, with their maximum scores. Solve the problems in the space provided. When writing a solution to a problem, **show all work**. No books or notes are allowed.

Problem 1 (10 pts.) Let $f(x) = x^3 - 4x^2 + 4x$.

(a) Factor $f(x)$ completely and find its zeros.



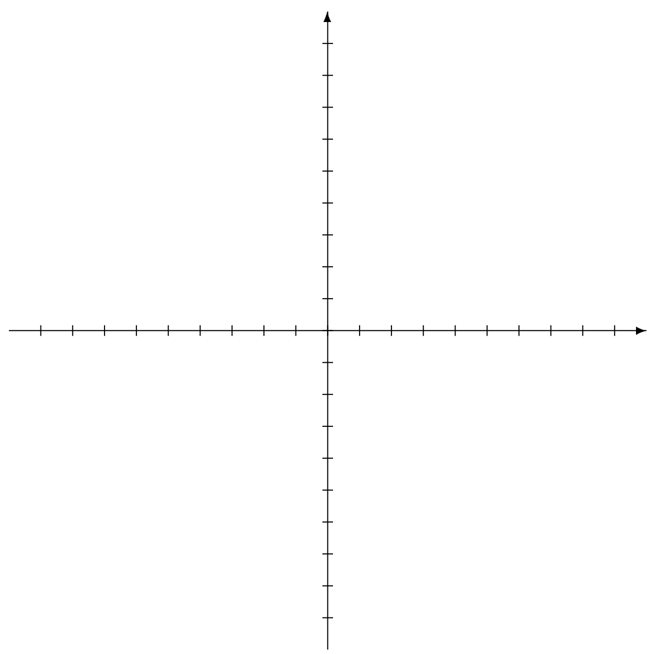
(b) In the space provided on the right, sketch the graph of $f(x)$. Mark the x- and y-intercepts. (Tickmarks are at distance 1 unit apart on both axes.)

Problem 2 (10 pts.) Solve the equation $\dfrac{1}{x^2-4} - \dfrac{2}{x+2} - \dfrac{1}{x-2} = 0$.

Problem 3 (15 pts.) Consider the rational function $f(x) = \dfrac{x^3 - 25x}{x^2 - 3x - 4}$.

(a) Determine **all** the asymptotes (vertical, horizontal, oblique) of the graph of $f(x)$.

(b) Determine the x- and y-intercepts. Then, using the space provided on the right, sketch the graph of $f(x)$, as well as the graphs of the asymptotes. (Tickmarks are at distance 1 unit apart on both axes. Draw asymptotes as dotted lines.)

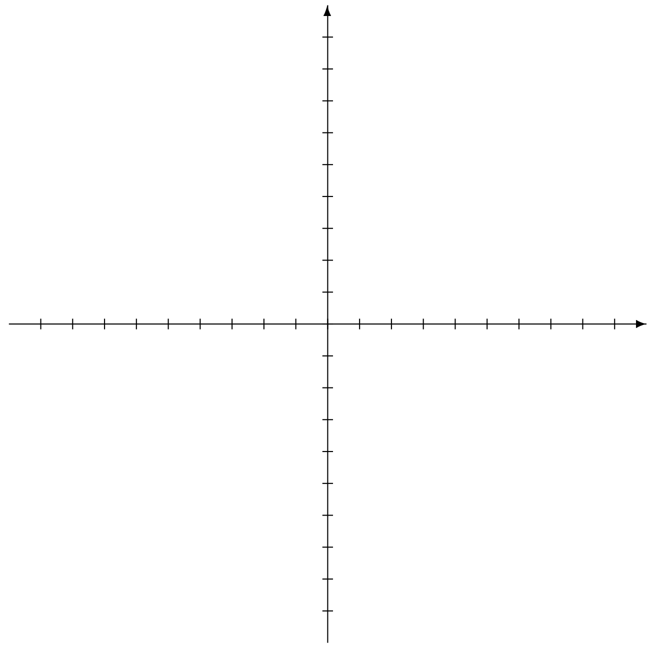


Problem 4 (10 pts.) Solve the inequalities (write solution sets using interval notation):

(a) $-2 \leq 3 - 2x < 5$.

(b) $|1 - 2x| \geq 3$

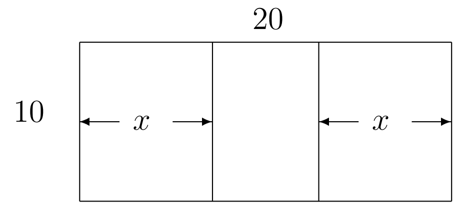
Problem 5 (10 pts.) Consider the quadratic function $f(x) = \frac{1}{2}x^2 + 2x - 6$. Determine the coordinates of the vertex, as well as the x- and y-intercepts. Then, using the space provided on the right, sketch the graph of $f(x)$. (Tickmarks are at distance 1 unit apart on both axes.)

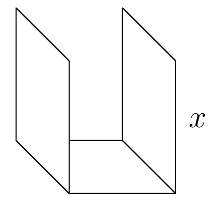


Problem 6 (10 pts.) One of the real zeros of the polynomial $f(x) = x^3 - 10x + 3$ is $c = 3$. Use synthetic division to find the other two zeros.

Problem 7 (10 pts.) Solve the equation: $\sqrt{10 - 2x} + x = 1$.

Problem 8 (10 pts.) A 20-in by 10-in metal sheet is bent on the long side to form a U-shape as shown on the right. (Later some cheap material is attached to complete a rectangular box.) How tall should the U-shape be, in order to maximize the volume of the box?





Problem 9 (15 pts.) Consider the polynomial $f(x) = 3x^4 - 2x^3 + 11x^2 - 8x - 4$.

(a) List all possible rational zeros of $f(x)$, predicted by the *Rational Zero Theorem.*

(b) Indicate which numbers, from the list found in part (a), are actual zeros of $f(x)$.

(c) Find the other zeros (real and complex) of $f(x)$. Then factor $f(x)$ into linear terms.