MAT 111 Exam III Spring 2003 Name _____

Instructions

1. Do all of your work in this booklet. Do not tear off any sheets.
2. **SHOW ALL OF YOUR STEPS** in the problems.
3. Be **clear and neat** in your work. Any illegible work, or scribbling in the margins, will not be graded.
4. Place a **box** around your answers.
5. Place your name on all of the pages.
6. If you need more space, you may use the back of a page, and write **On back of page __** in the problem space.

Problem	Score
1 (10 pts)	
2 (20 pts)	
3 (15 pts)	
4 (15 pts)	
5 (10 pts)	
Total (70 pts)	

Problem 1. **Multiple Guess** (10 pts) In this section, find the answer which best fits the question and write it in the space provided**.**

a) Which of the following is an even function?
a) $f(x) = |x| - 1$, b) $h(x) = \sqrt{2 - x^2}$, c) $\frac{1}{x}$,
d) $f(x) = g(x) = x^3 + 5x$, e) none of these _____

b) The graph of the equation $2x^3 + 3y = 4$ is symmetric about the
a) x-axis b) y-axis c) origin d) line $y = x$ _____

c) The graph of the equation $y = 3x^2 - 2x^4$ is symmetric about the
a) x-axis b) y-axis c) origin d) line $y = x$ _____

d) Simplifying i^{73}, one obtains
a) 0 b) 1 c) i d) -1 e) $-i$ _____

e) Classify the roots of the equation $5x^2 + 10x - 5 = 0$.
a) One real root b) Two distinct real roots
c) Two complex conjugate roots _____

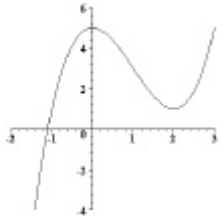
f) What is the local maximum of $P(x) = (x + 2)(2 - x)$?
a) 0 b) -4 c) (0,-4) d) 4 e) there is none _____

g) $f(x) = x^{-1}$ is called the _____ function.
a) Identity b) Reciprocal c) Neither of these _____

h) The function represented by the below graph is a
a) Polynomial of degree 3. b) Rational function
c) Quadratic function d) Polynomial of degree 4
_____

h) The function in the below graph is increasing in which of the following open intervals?
a) $(-\infty, 0)$ b) $[0,2)$ c) $(0,2)$ d) $(0, \infty)$ _____

i) For $R(x) = \dfrac{x^2 - 1}{(x-1)(x+2)}$, the domain is
a) $\{x | x \neq -1, 1\}$, b) $\{x | x \neq 1, 2\}$, c) $\{x | x \neq -1, 2\}$,
d) $\{x | x \neq 1, -2\}$, e) none of these. _____



Problem 2. Solutions (20 pts)

a) Simplify and put the expressions in standard form:

i. $(6 - 5i)(2 + i)$.

ii. $\dfrac{3 + 2i}{1 - 2i}$.

b) Solve and give solution in interval notation:

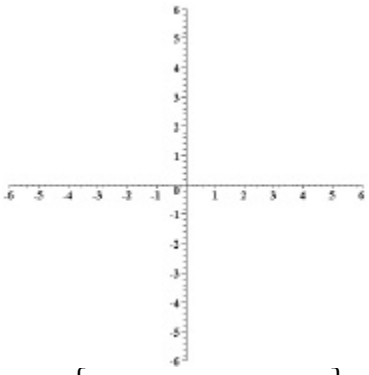
i. $x^2 + 2x - 24 \leq 0$.

ii. $\dfrac{(x+2)(x-5)}{x-7} \leq 0$.

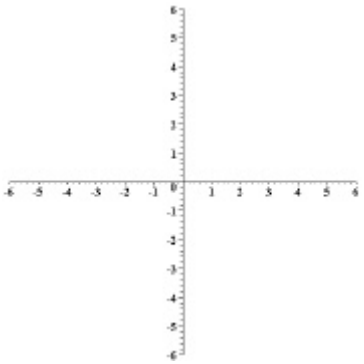
MAT 111 Exam III Spring 2003 **Name** _____

Problem 3. Graphing (15 pts)

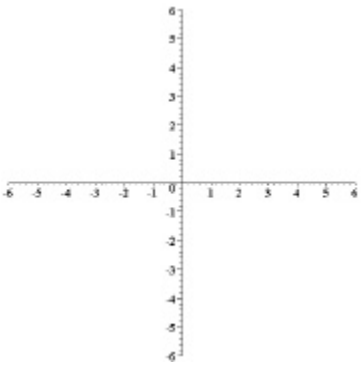
a) Graph $f(x) = |x+2| - 4$ using transformations:



b) Graph the function $f(x) = \begin{cases} 4 & x < -4 \\ |x|, & -4 \le x < 4 \\ x-4, & x \ge 4 \end{cases}$.



c) Sketch the function $f(x) = (x+4)(x-2)^2$ and indicate all intercepts.



Problem 4. Rational Function (15 pts) For the function $f(x) = \dfrac{3(x+2)}{x^2-9}$, give the following:

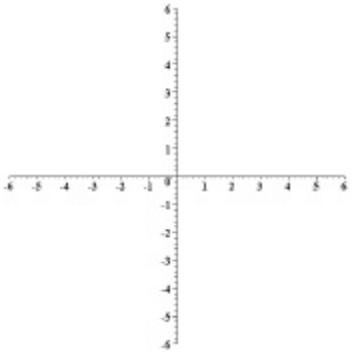
a) *y*-intercept

b) *x*-intercepts

c) vertical asymptotes

d) horizontal asymptote

e) Graph $y = f(x)$; include *x*- and *y*-intercepts and all asymptotes.



Problem 5. Miscellaneous (10 pts)

a) Let $f(x) = 3x^2 + 1$ and $g(x) = 5x + 1$. Find $f \circ g$.

b) Find all of the roots of the polynomial.
$x^3 + 10x^2 - 75x = 0$.