SAMPLE MIDTERM 1
MAT 125 Spring 2005
Midterm 1 is 8:30-10:00pm, Monday, 2/21/05
Exam locations given on right

room	sections
Javits 100	1-5,9,12,14,15
Javits 102	6,7,13
Javits 110	8,10,11
Javits 101	ELC 4

1. Place the letter corresponding to the correct answer in the box next to each question. Each question is worth 1 point.

(i) Suppose f is a linear function such that $f(1) = -1$ and $f(3) = 2$. Then $f(4) =$? **(a)** 3 **(b)** $3\frac{1}{3}$ **(c)** $3\frac{2}{3}$ **(d)** $3\frac{1}{2}$ **(e)** $3\frac{3}{4}$ **(f)** none of these.

(ii) Simplify $\log_2(4x^2 2^x)$ **(a)** $\ln 2 + 2\ln x + x$ **(b)** $\log_2 2 + 2\log_2 x + x$ **(c)** $\ln 4 + 2\ln x + x\ln 2$ **(d)** $2 + 2\ln x + x$ **(e)** $2 + 2\log_2 x + x$ **(f)** none of these.

(iii) Using the infomation in the table, estimate $\log_3 5$. **(a)** 1.16 **(b)** 1.26 **(c)** .68 **(d)** .86 **(e)** 1.46 **(f)** none of these.

x	$\ln(x)$
2	.69
3	1.10
4	1.39
5	1.61

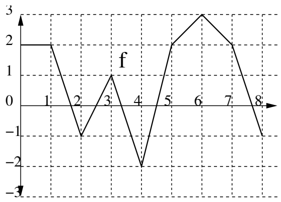
(iv) Express the following function as an explicit formula: take a number and add 1 to it; then square the result and multiply by 4. **(a)** $f(x) = 4(x+1)^2$ **(b)** $f(x) = (4x+1)^2$ **(c)** $f(x) = 4x^2 + 1$ **(d)** $f(x) = (4x)^2 + 1$ **(e)** $f(x) = 4(x^2 + 1)$ **(f)** none of these.

(v) The function $h(x) = x^2 + 1$ is a composition of the form $h(x) = f(g(x))$ where **(a)** $f(x) = x^2$ and $g(x) = 1$ **(b)** $f(x) = x^2$ and $g(x) = x + 1$ **(c)** $f(x) = x + 1$ and $g(x) = x^2$ **(d)** $f(x) = x$ and $g(x) = x^2$ **(e)** $f(x) = (x+1)^2$ and $g(x) = -2x$ **(f)** none of these.

(vi) Which of the following functions is not defined for all real numbers? **(a)** $y = \sin(x^2)$ **(b)** $\ln(1 + x^2)$ **(c)** $y = e^{\cos(x)}$ **(d)** $y = \ln(\sin(x))$ **(e)** $y = \sqrt{\cos(x) + 2}$ **(f)** none of these.

(vii) Simplify $\log_{10} 1000$. **(a)** 1 **(b)** 2 **(c)** 1/2 **(d)** 3 **(e)** 4 **(f)** none of these.

(viii) Suppose f is graphed in the figure on the right. Let $g(x) = 4 - f(x)$. Where does g take its maximum value on $0 \le x \le 8$. **(a)** $x = -2$ **(b)** $x = -1$ **(c)** $x = 0$ **(d)** $x = 1$ **(e)** $x = 3$ **(f)** none of these.



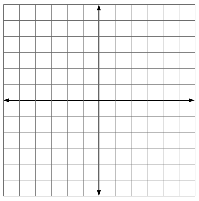
(ix) What is the degree 5 coefficient of the polynomial $p(x) = x^2(x+1)(x+3x^3+4x^4)$? **(a)** 0 **(b)** 1 **(c)** 2 **(d)** 3 **(e)** 4 **(f)** none of these.

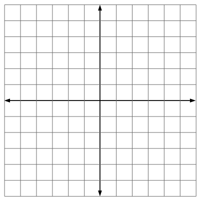
2. Sketch

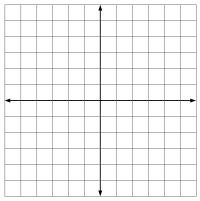
(i) $y = \frac{1}{3}x - 2$

(ii) $y = -x^2 + 4x + 4$

(iii) $y = \sqrt{6 - x}$







3. Find each of the following limits (or say that it does not exist).

   (i) $\lim_{x \to 0} x/|x|$.

   (ii) $\lim_{x \to 0^+} \sqrt{x + 4}$

   (iii) $\lim_{x \to 2} x^3 + x$

   (iv) $\lim_{x \to 2} (x^2 - 4)/(x - 2)$

   (v) $\lim_{x \to 1} (x + 1)/(x - 1)$.

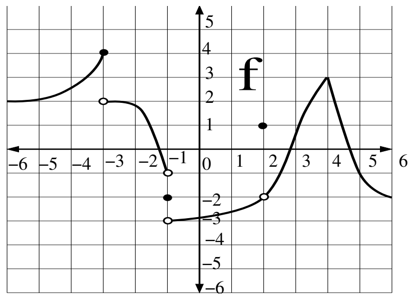
4. Answer the following questions based on the graph of the function f below. Assume the domain of the function is the interval $0 \le x \le 8$.

   (i) What is $f(-3)$?

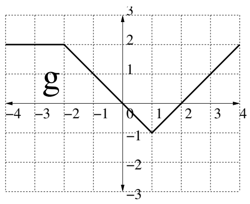
   (ii) What is $\lim_{x \to -1^+} f(x)$?

   (iii) At what point is f continuous from the left but not continuous from the right?

   (iv) Where is f discontinuous?



5. Find a formula for the piecewise linear function g graphed below by finding the correct formula for each of its linear segments. Give the intervals on which each formula is valid.



6. Each of the following polynomials and rational functions is graphed below. Match the formulas to the correct graphs (shown on $-2 \le x \le 2$).

   $\square$ $x(x-1)(x^2-4)$ $\square$ $(x-1)^2(x+2)$ $\square$ $\frac{x^2-1}{x^2} + 5$ $\square$ $\frac{x^2-1}{x}$