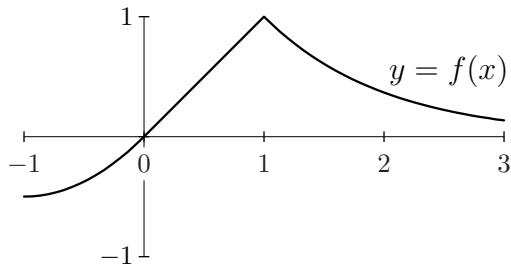
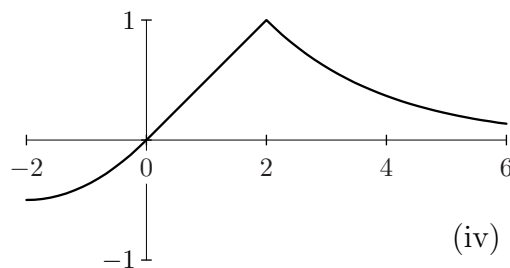
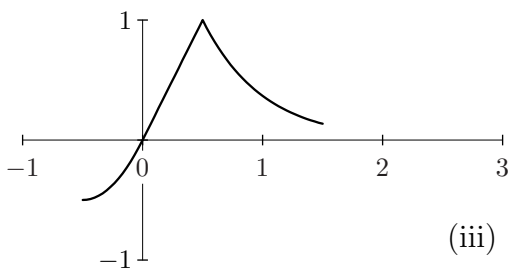
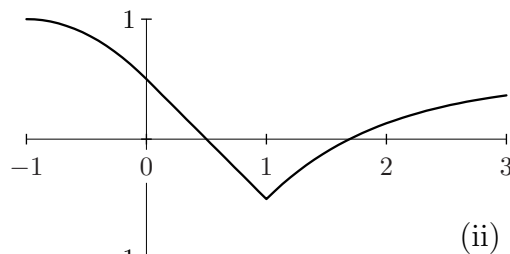
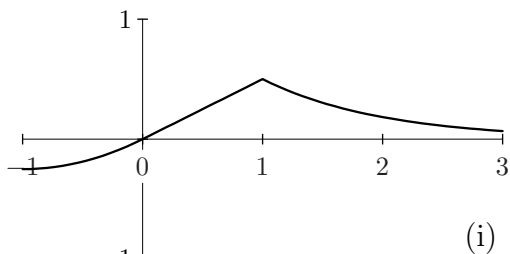


**College of the Holy Cross, Fall Semester, 2005**  
**Math 131, Practice Midterm 1**

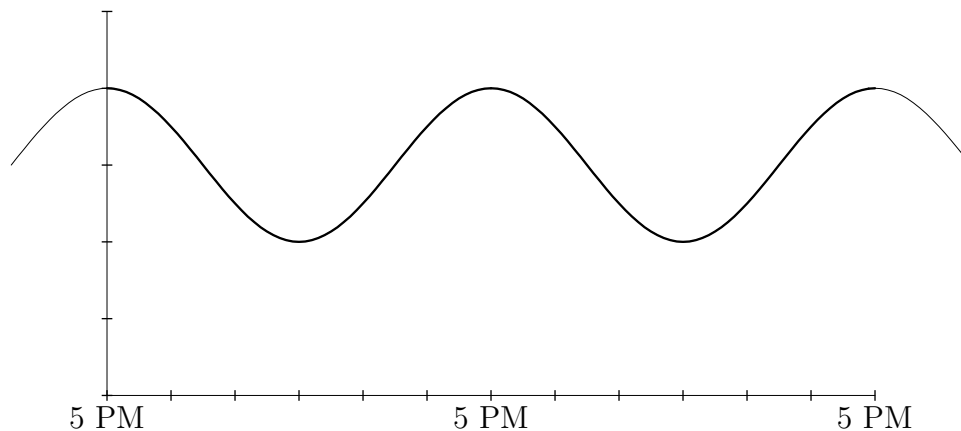
1. The graph  $y = f(x)$  and four graphs obtained by transforming it are shown. Match the given formulas with the corresponding graph. Note that there is an extra graph.



- (a)  $y = f(2x)$ : \_\_\_\_\_      (b)  $y = \frac{1}{2}f(x)$ : \_\_\_\_\_      (c)  $y = \frac{1}{2} - f(x)$ : \_\_\_\_\_



2. The desert temperature  $H$  varies sinusoidally from a high of  $80^\circ\text{F}$  at 5 PM to a low of  $40^\circ\text{F}$  at 5 AM. Find a formula for  $H$  as a function of  $t$ , with  $t$  measured in hours from 5 PM. You may use the graph below for reference; it's a good idea to start by labeling the vertical and horizontal scales.



3. In each part, fill in the table as indicated.

Give **exact answers**: Use fractions, square roots, logarithms, etc. as needed.

(a) Assuming  $f$  is a **linear function**.

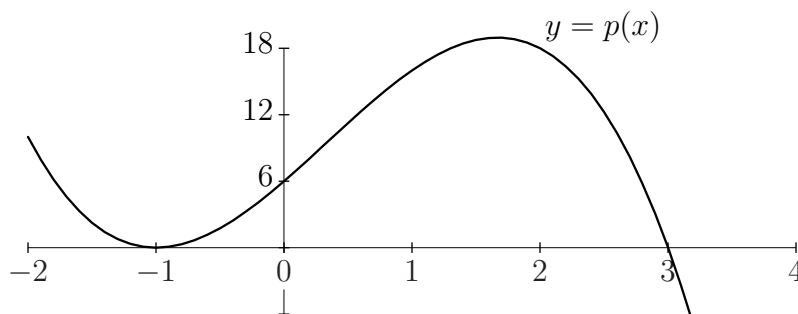
$x$	-1	2	5	10
$f(x)$	24	12		

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(b) Assuming  $f$  is an **exponential function**.

$x$	-1	2	5	10
$f(x)$	24	12		

4. Find the polynomial whose graph is shown; express your answer in **both** factored and expanded (multiplied out) form.



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5. Let  $y = f(x) = x^2 - 3$  for  $x \geq 0$ .

(a) Find the inverse function in the form  $y = f^{-1}(x)$ , and find the domain of  $f^{-1}$ .

(b) Suppose  $g(x) = x + 2$ . With  $f(x)$  as above, find  $f(g(x))$ ; simplify your answer.

6. An automobile costs \$25,000 and depreciates in value by 20% per year. How many years pass before the car is worth \$5000? Give both an **exact answer** and a numerical answer rounded to two decimal places.