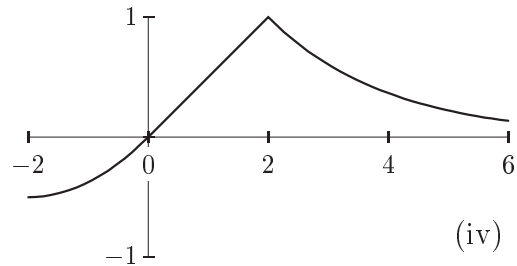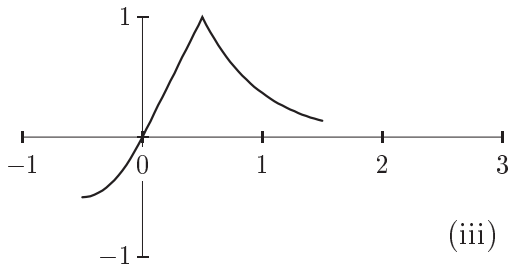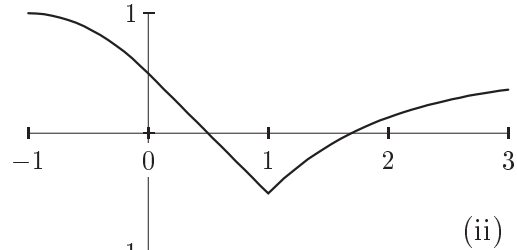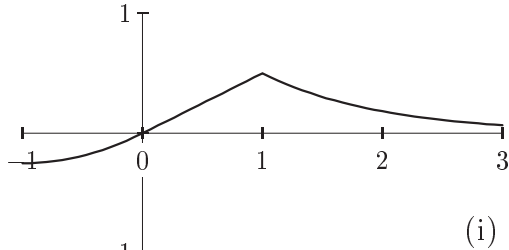**College of the Holy Cross, Fall Semester, 2005**
**Math 131, Practice Midterm 1**

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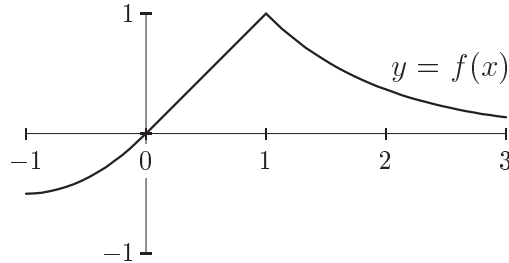
(a) $y = f(2x)$:_____   (b) $y = \frac{1}{2}f(x)$:_____   (c) $y = \frac{1}{2} - f(x)$:_____

(i)

(ii)

(iii)

(iv)

2. [20 points]   The desert temperature H varies sinusoidally from a high of 80°F at 5 PM to a low of 40°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.

5 PM   5 PM   5 PM

1
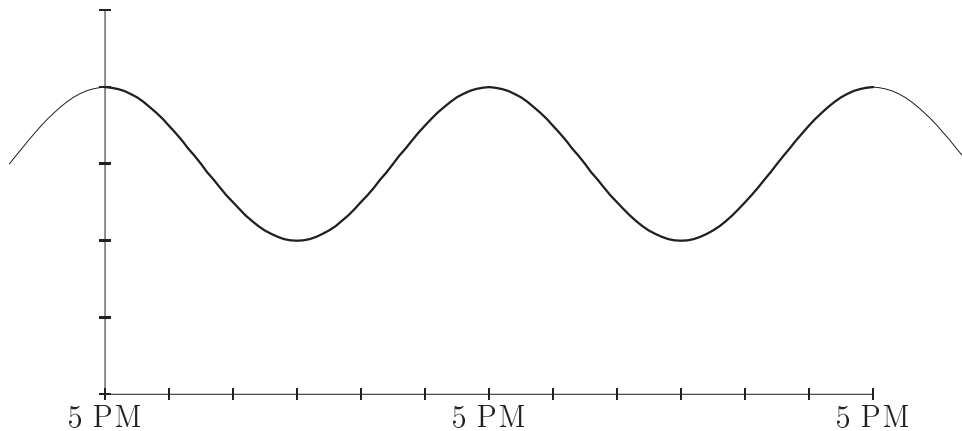
3. [10 points each]   In each part, fill in the table as indicated.
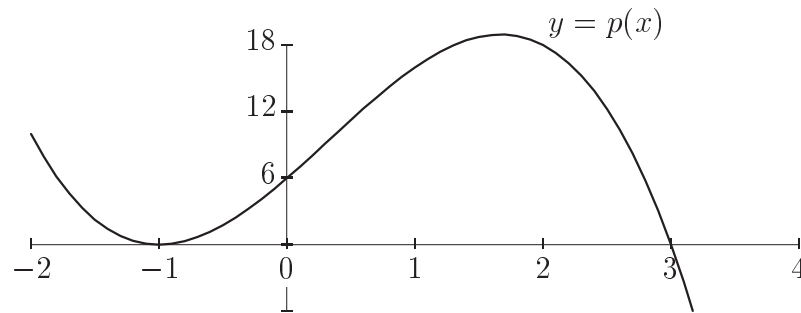   Give **exact answers**: Use fractions, square roots, logarithms, etc. as needed.

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

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

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

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

4. [10 points]   Find the polynomial whose graph is shown; express your answer in **both** factored and expanded (multiplied out) form.

$$y = p(x)$$

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5. [10 points each]   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 $f\big(g(x)\big)$; simplify your answer.

6. [20 points]   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.