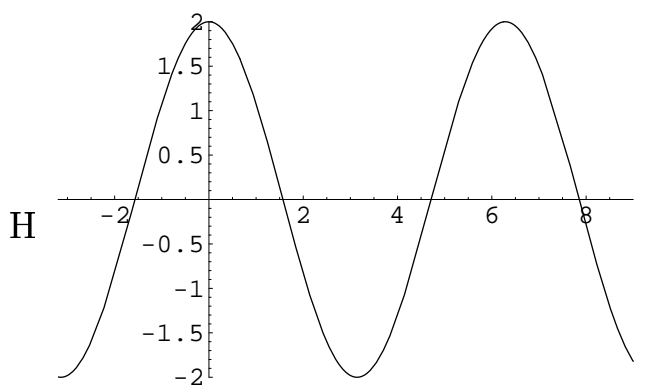
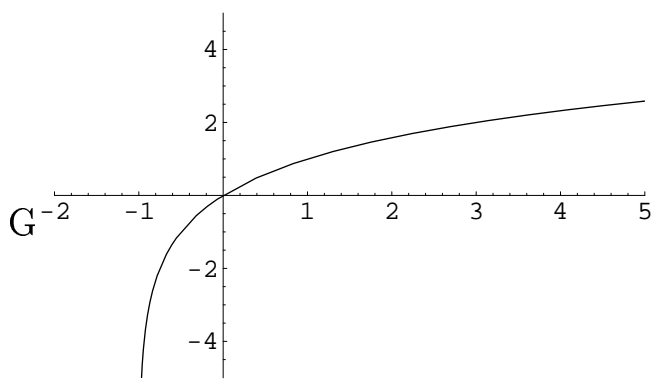
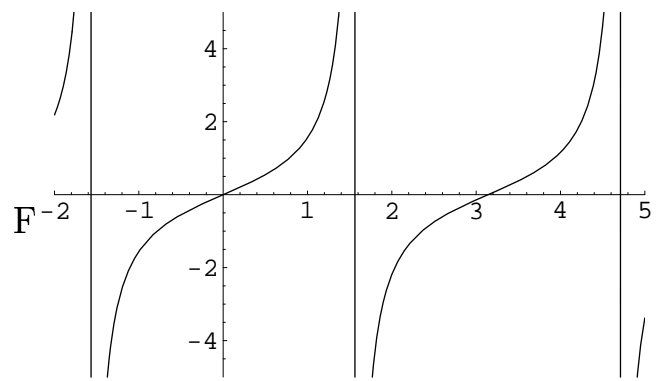
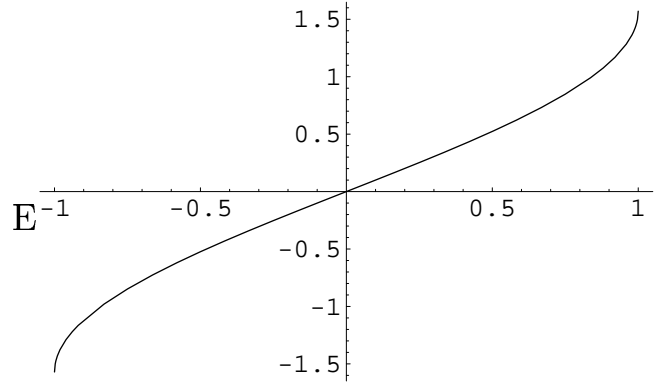
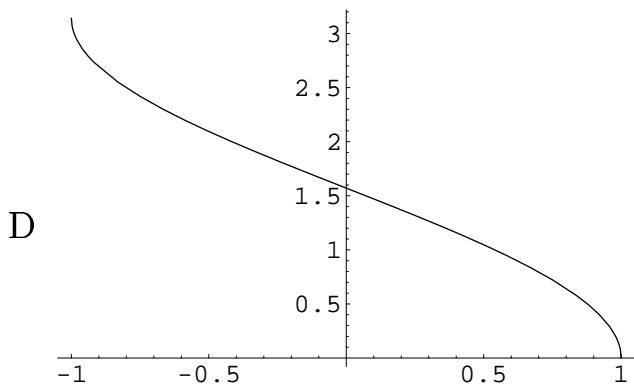
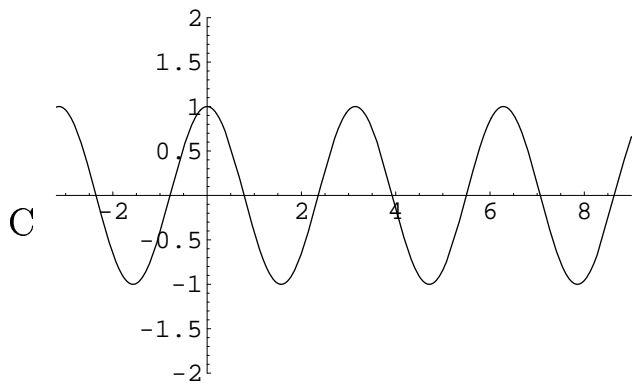
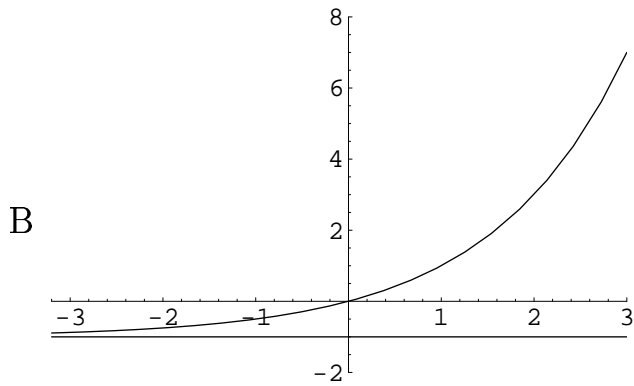
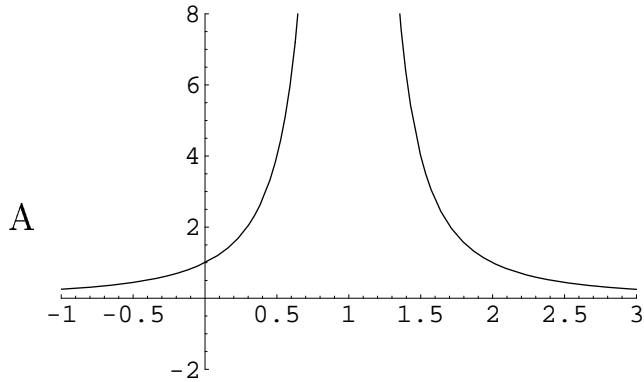


Problem 1 (8 points)

Match the following graphs to their functions, listed below.



- | | | | |
|--|---|--|--|
| <input type="checkbox"/> $y = \cos 2x$ | <input type="checkbox"/> $y = 2 \cos x$ | <input type="checkbox"/> $y = 2^x - 1$ | <input type="checkbox"/> $y = \frac{1}{(x-1)^2}$ |
| <input type="checkbox"/> $y = \log_2(x + 1)$ | <input type="checkbox"/> $y = \tan x$ | <input type="checkbox"/> $y = \sin^{-1} x$ | <input type="checkbox"/> $y = \cos^{-1} x$ |

Problem 2 (8 points)

Find the minimum value attained by the function $f(x) = x^4 - 6x^2 + 10$, as well as all x -coordinates where this minimum value occurs.

Problem 3 (8 points)

Use an angle sum, angle difference, or half angle identity to find $\sin 75^\circ$. State the identity you use.

Problem 4 (8 points)

Find the domains of the following functions. Express each domain in interval notation.

1. $f(x) = x - \sqrt{x}$

2. $g(x) = \cos^{-1}(x)$

3. $h(x) = \log(x) + \log(3 - x)$

4. $p(x) = 5x^3 + 4x^2 - 9$

Problem 5 (10 points)

Graph the following rational function. Locate and label all intercepts, asymptotes, and points where this function crosses an asymptote. You may use any valid method you know. Keep in mind that the easier it is to understand your steps, the easier it is to give partial credit.

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

Problem 6 (10 points)

Find all real solutions to the equation $2 \cos \theta + \sin^2 \theta = 1$. How many of these solutions lie in the interval $[0, 2\pi)$?

Problem 7 (8 points)

Let $\theta = \frac{7\pi}{6}$. Find:

1. $\sin \theta$

2. $\cos \theta$

3. $\tan \theta$

4. $\sec \theta$

5. $\csc \theta$

6. $\cot \theta$

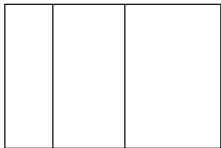
Problem 8 (*8 points*)

If $\cos \theta = 1/4$ and $-\frac{\pi}{2} < \theta < 0$, find:

1. $\sin \theta$
2. $\tan \theta$
3. $\cos 2\theta$

Problem 9 (*8 points*)

I want to fence a rectangular region, subdivided into three parts as shown (with all fences running north-south or east-west). Supposing I have 1000 feet of fence available and I enclose the maximum possible total area, what are the dimensions of the fenced region?

**Problem 10** (*8 points*)

Simplify $\ln(\log_4 28 - \log_4 7)$.

Problem 11 (*8 points*)

Solve for x :

$$3(4 - e^x) \leq -2$$

Problem 12 (*8 points*)

The circle below has radius 3, and the indicated angle measures 2.1 radians. What is the area of the triangle? (Your answer should be a formula involving numbers, but no variables—you don't have to simplify the result.)

