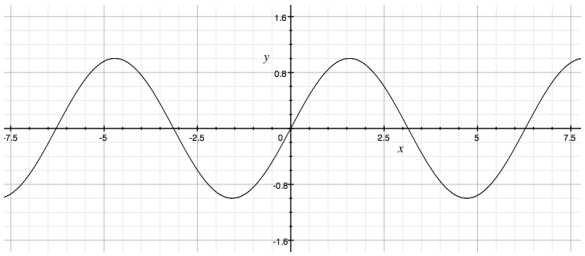
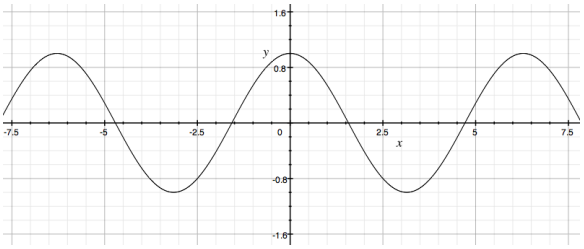
SECTION 3.3 DERIVATIVES OF TRIG FUNCTIONS

1. Use the graphs of $y = \sin x$ and $y = \cos x$ to sketch a graph of y'.





2. Use what we learned in 4. and 5. above to find the derivative of:

   (a) $y = 3x^4 \cos(x)$

   (b) $y = \tan(x)$ (Use the Quotient Rule.)

3. Fill in the table below.

Derivatives of Trigonometric Functions:

- $\frac{d}{dx}(\sin x) =$ _____
- $\frac{d}{dx}(\cos x) =$ _____
- $\frac{d}{dx}(\tan x) =$ _____
- $\frac{d}{dx}(\csc x) =$ _____
- $\frac{d}{dx}(\sec x) =$ _____
- $\frac{d}{dx}(\cot x) =$ _____

4. Find the derivative of $y = \dfrac{\sec x}{1 - x \tan x}$.

5. If $f(\theta) = e^{\theta}\sin(\theta)$, find $f''(\theta)$. Simplify your answers here.

6. Find $\dfrac{d}{dt}\left[t\sin t\cos t\right]$.

7. An elastic band is hung on a hook and a mass is hung on the lower end of the band. When the mass is pulled down 2 cm past its rest position and then released, it vibrates vertically. The equation of motion is

$$s = 2\cos t + 3\sin t, \quad \text{for } t \geq 0,$$

where s is measured in centimeters and t is measured in seconds. (We are taking the positive direction to be downward.)

   (a) Find $s(0)$, $s'(0)$, and $s''(0)$ including units.

   (b) What do the numbers from part (a) indicate about the mass in the context of the problem?