

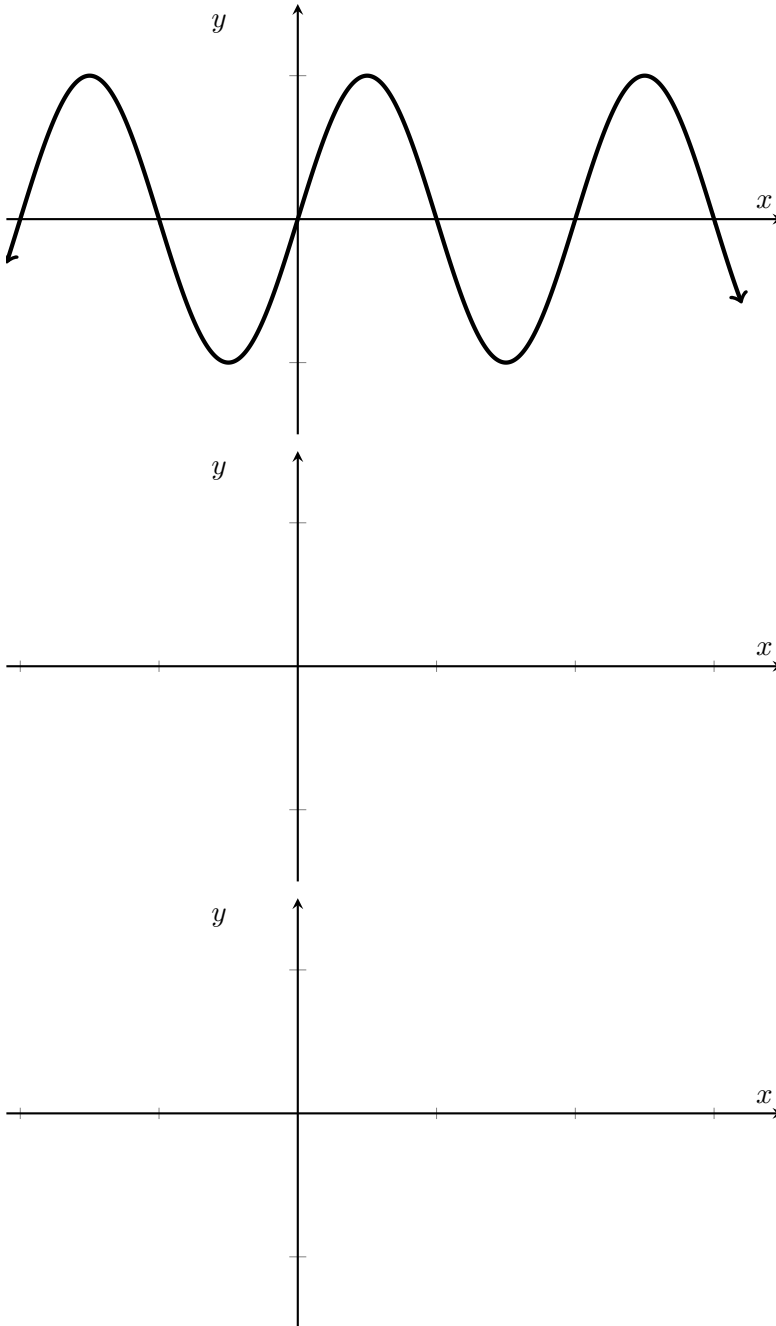
## SECTION 3-5: DERIVATIVES OF TRIGONOMETRIC FUNCTIONS

Read Section 3.5. Work the embedded problems.

1. Find the derivative of  $f(x) = \frac{1}{3}x^3 - \frac{x}{3} + \frac{\pi^2}{3}$ . (What's wrong with the answer below?)

**answer:**  $f(x) = \frac{1}{3}x^3 - \frac{x}{3} + \frac{\pi^2}{3} = \frac{1}{3}(x^3 - x + \pi^2) = \frac{1}{3}(3x^2 - 1) = f'(x)$

2. (Good review for Midterm) The graph of  $f(x)$  is sketched below. Graph its derivative  $f'(x)$ . Then, use your graph of  $f'(x)$  to graph the derivative of  $f''(x)$ .



3. Find the derivative.

(a)  $y = x^2 + 5 \sin(x)$

(b)  $f(\theta) = \theta \cos(\theta)$

(c)  $g(x) = \frac{\sin(x)}{x+1}$

(d)  $H(x) = \frac{\sin(x)}{\cos(x)}$

4. A mass on a spring vibrates horizontally on a smooth level surface. Its equation of motion is  $x(t) = 8 \sin(t)$ , where  $t$  is in seconds and  $x$  is in centimeters.

(a) Find the velocity and acceleration at time  $t$ .

(b) Find the position, velocity, and acceleration of the mass at time  $t = 2\pi/3$ . In what direction is it moving at this time? Is it speeding up or slowing down?