SECTION 3-5: DERIVATIVES OF TRIGONOMETRIC FUNCTIONS (EXTRA PRACTICE)

1. (Revisit the spring problem:) 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) We found:
   $v(t) = x'(t) = 8\cos(t)$ and $a(t) = v'(t) = x''(t) = -8\sin(t)$

   (b) We found:
   $x(2\pi/3) = 4\sqrt{3}\ cm$
   $x'(2\pi/3) = -4\ cm/s$
   $x''(2\pi/3) = -4\sqrt{3}\ cm/s^2$
   At $t = 2\pi/3$, the mass is moving to the left and slowing down.

   (c) Draw a picture of the motion of the mass and include the time(s) at which the mass changes direction.

2. Higher Order Derivatives. For each function below, find $f'(x),\ f''(x),\ f'''(x),\ f^{(4)}(x),\ f^{(82)}(x)$

   (a) $f(x) = x^5 + 2x^2 + 1$

   (b) $f(x) = 2\sin(x)$

3. Other ways of denoting derivatives.