Name: _____

Graphs of Sine and Cosine Functions

Exercise 1: Write a sine equation with a period of 3π and amplitude of 7.

Exercise 2: Find the amplitude, period, phase shift, and vertical shift for each of the given functions and identify whether there has been an x-axis reflection.

1) $y = 2\cos(x+3) - 4$

2) $y = 3\sin(x+3\pi) + 2$

3) $y = -\sin\left(\dfrac{\pi}{2}x - \dfrac{\pi}{4}\right) + 1$

4) $y = 4\cos\left(x - \dfrac{4\pi}{3}\right)$

Exercise 3: Describe the relationship between the graphs of f and g. Consider the amplitude, period, and shifts

1) $g(x) = \sin x$
   $f(x) = \sin(x - \pi)$

2) $g(x) = \sin 4x$
   $f(x) = \sin(4x - 3) + 1$

3) $g(x) = \cos\dfrac{\pi}{2}x$
   $f(x) = \cos(\dfrac{\pi}{2}x - \dfrac{\pi}{3}) + 4$

4) $g(x) = \cos 3x$
   $f(x) = 2\cos(3x - \pi) + 4$

Exercise 4: For a person at rest, the velocity v (in liters per second) of air flow during a respiratory cycle (the time from the beginning of one breath to the beginning of the next) is given by $v = 0.85\sin\dfrac{\pi t}{3}$, where t is the time (in seconds). (Inhalation occurs when $v > 0$, and exhalation occurs when $v < 0$.)

1) Find the time for one full respiratory cycle.
2) Find the number of cycles per minute.
3) Sketch the graph of the velocity function.