

Name: \_\_\_\_\_

## Graphs of Sine and Cosine Functions

**Exercise 1:** Describe the relationship between the graphs of  $f$  and  $g$ . Consider amplitude, period, and shifts.

- |    |                  |                        |
|----|------------------|------------------------|
| 1) | $f(x) = \sin x$  | $g(x) = \sin(x - \pi)$ |
| 2) | $f(x) = \cos x$  | $g(x) = \cos(x + \pi)$ |
| 3) | $f(x) = \cos 2x$ | $g(x) = -\cos 2x$      |
| 4) | $f(x) = \sin 3x$ | $g(x) = \sin(-3x)$     |
| 5) | $f(x) = \sin 2x$ | $g(x) = 3 + \sin 2x$   |
| 6) | $f(x) = \cos 4x$ | $g(x) = -2 + \cos 4x$  |

**Exercise 2:** Graph  $f$  and  $g$  on the same set of coordinate axes. (Include two full periods.)

- |    |  |   |
|----|--|---|
| 1) | $f(x) = -2 \sin x$                     | $g(x) = 4 \sin x$                         |
| 2) | $f(x) = \sin x$                        | $g(x) = \sin \frac{x}{3}$                 |
| 3) | $f(x) = \cos x$                        | $g(x) = 1 + \cos x$                       |
| 4) | $f(x) = 2 \cos 2x$                     | $g(x) = -\cos(x - \pi)$                   |
| 5) | $f(x) = -\frac{1}{2} \sin \frac{x}{2}$ | $g(x) = 3 - \frac{1}{2} \sin \frac{x}{2}$ |
| 6) | $f(x) = 4 \sin \pi x$                  | $g(x) = 4 \sin \pi x - 3$                 |
| 7) | $f(x) = 2 \cos x$                      | $g(x) = 2 \cos(x + \pi)$                  |
| 8) | $f(x) = -\cos x$                       | $g(x) = -\cos(x - \pi)$                   |
| 9) | $f(x) = \cos 4x$                       | $g(x) = -\cos 4x$                         |