Name: _____ Date: _____

8.1 Sums and Differences of Functions

BLM 8–2

1. Let $f(x) = 3x - 5$ and $g(x) = 2x + 3$.

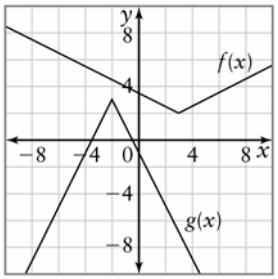
a) Write the equation for $h(x) = f(x) + g(x)$.

b) Determine the value of $h(2)$.

c) Write the equation for $k(x) = f(x) - g(x)$.

d) Determine the value of $k(2)$.

2. Use the functions $f(x)$ and $g(x)$ as shown.



a) Apply the superposition principle to graph $y = f(x) + g(x)$ and $y = f(x) - g(x)$.

b) Give the domain and range of $y = f(x) + g(x)$.

c) Give the domain and range of $y = f(x) - g(x)$.

3. Let $f(x) = x^2$ and $g(x) = \frac{1}{x}$.

a) Graph $y = f(x)$, $y = g(x)$, and $y = f(x) + g(x)$ on the same set of axes.

b) State the domain and range of $y = f(x) + g(x)$.

c) For large values of x, does $y = f(x) + g(x)$ behave more like $y = f(x)$ or like $y = g(x)$? Explain.

4. A salesperson has fixed costs of \$1500 per month and variable costs of \$200 per unit sold. She earns \$250 per unit sold. She can sell a maximum of 200 units per month.

a) Write an equation for C, her total cost, as a function of n, the number of units sold.

b) Write an equation for R, her revenue, as a function of n, the number of units sold.

c) Graph C and R on the same set of axes.

d) What is the break-even point?

e) Write the equation for her profit $P(n) = R(n) - C(n)$.

f) In this context, what are the domain and range for P?

g) What value would she need to reduce her variable costs to, in order to have a break-even point of 20 units sold?

5. **a)** Sketch graphs of $f(x) = \sin x$ and $g(x) = \cos x$ on the same set of axes. Use the domain $-3\pi \le x \le 3\pi$.

b) Use the principle of superposition to sketch a graph of $y = f(x) + g(x)$.

c) Determine the equation of $y = f(x) + g(x)$. Express your answer as a sine function.

d) Sketch a graph of $y = f(x) - g(x)$.

e) Determine the equation of $y = f(x) - g(x)$. Express your answer as a sine function.

6. **Use Technology** Investigate Fourier series.

a) Graph each function.

$$y = \sin(x) + \frac{1}{3}\sin(3x)$$

$$y = \sin(x) + \frac{1}{3}\sin(3x) + \frac{1}{5}\sin(5x)$$

$$y = \sin(x) + \frac{1}{3}\sin(3x) + \frac{1}{5}\sin(5x) + \frac{1}{7}\sin(7x)$$

b) What shape do the graphs seem to be approaching as more terms are added? Test your answer by graphing the function with two more terms added.

c) Repeat parts a) and b) for the function

$$y = \frac{1}{2}\sin(2x) + \frac{1}{4}\sin(4x) + \frac{1}{6}\sin(6x) + \frac{1}{8}\sin(8x)\ldots$$