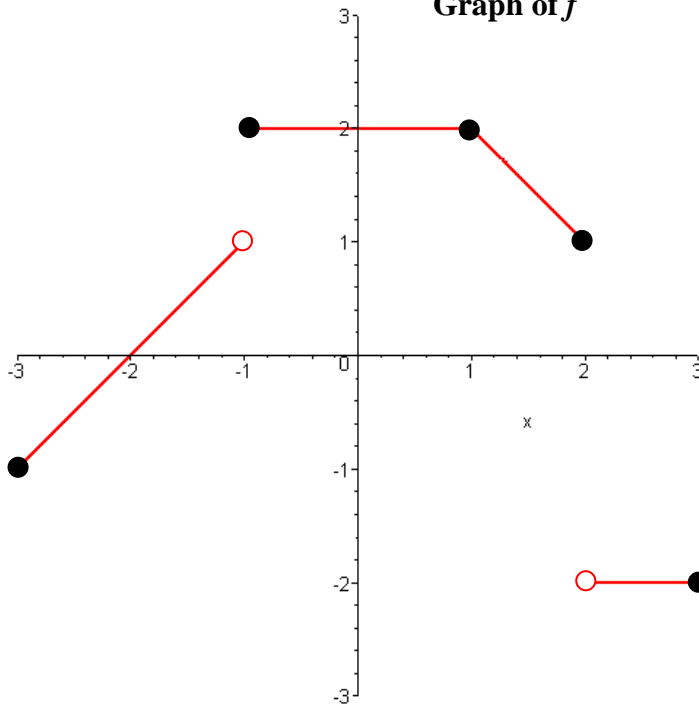


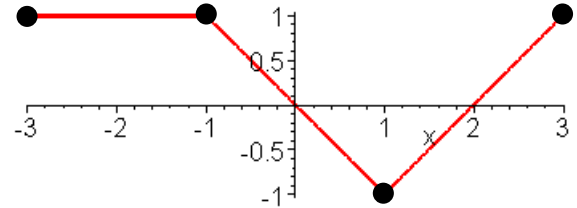
Math 2412 Review 1

1. Use the graphs of the functions f and g to determine the following:

Graph of f



Graph of g



- | | | | |
|--|---|--------------------------------------|-----------------------------|
| a) $f(0)$ | b) $g(\frac{1}{2})$ | c) $f(-1)$ | d) $(f + g)(-2)$ |
| e) $(f - g)(\frac{3}{2})$ | f) $(f \cdot g)(-3)$ | g) $\left(\frac{f}{g}\right)(2)$ | h) $(f \circ g)(1)$ |
| i) $(f \circ f)(1)$ | j) $(g \circ g)(\frac{1}{2})$ | k) $(f \circ g \circ f)(1)$ | l) $(g \circ f \circ g)(1)$ |
| m) Where is f increasing? | n) Where is f decreasing? | o) Where is f constant? | |
| p) Does f have a local maximum at $x = -1$? | q) Does f have a local minimum at $x = 2$? | | |
| r) Solve $-1 \leq g(x) < 0$. | s) Solve $0 < f(x) \leq 1$. | t) Solve $g(x) = \frac{1}{2}$. | |
| u) Solve $f(x) = -\frac{3}{2}$. | | | |
| v) Graph $h(x) = g(x - 1)$. | | w) Graph $h(x) = \frac{1}{2}g(x)$. | |
| x) Graph $h(x) = -f(x)$. | | y) Graph $h(x) = f(-x)$. | |
| z) Graph $h(x) = f(x) $. | | aa) Graph $h(x) = g(\frac{1}{2}x)$. | |
| bb) Graph $h(x) = g(x + 1) - 1$. | | cc) Graph $h(x) = g(2 - x)$. | |
| dd) Graph $h(x) = \begin{cases} g(x); & x \geq -1 \\ f(x); & x < -1 \end{cases}$. | | | |

2. Determine the domains of the following functions.

a) $f(x) = \frac{1}{x^3 + 9x}$

b) $g(x) = \frac{2x - 9}{\sqrt{x - 1}} + \frac{1}{x - 3}$

c) $h(x) = \frac{\sqrt[4]{5 - x}}{\sqrt{x - 1}}$

3. Determine if the following functions are even, odd, neither, or both. **Justify your answers.**

a) $f(x) = x^5 - x$

b) $g(x) = \frac{x^5 + x^3}{x^3 - x}$

c) $h(x) = x^2 - (-x)^2$

d) $j(x) = \begin{cases} x-1 & ; 1 \leq x \leq 2 \\ x+1 & ; -2 \leq x \leq -1 \end{cases}$

4. Use the piecewise-defined function $f(x) = \begin{cases} -(x+3)^2 & ; -3 \leq x < -1 \\ x-1 & ; -1 \leq x < 1 \\ 3-x & ; 1 \leq x \leq 3 \end{cases}$ to determine the

following:

a) $f(-4)$

b) $f(-2)$

c) $f(-1)$

d) $f(\frac{3}{2})$

e) $f(4)$

f) $(f \circ f)(\frac{5}{2})$

g) Graph the function f .

h) Determine the range of f .

i) What is the absolute maximum value of f ?

j) What is the absolute minimum value of f ?

k) Where is f increasing?

l) Where is f decreasing?

m) Where does f have local maxima?

n) Where does f have local minima?

Sketch the graphs of the following quadratic functions. Indicate the vertex and intercepts.

5. $f(x) = -(x-1)^2 - 2$

6. $f(x) = x^2 + 2x - 3$

Find a formula for the quadratic function whose graph satisfies the given conditions.

7. Its vertex is at $(-2, 4)$ and the graph contains the point $(1, -5)$.

8. Its graph has x -intercepts of 1 and -2 , and it contains the point $(4, 9)$.

9. Its graph contains the points $(1, -1)$, $(0, 1)$, and $(2, 2)$.

10. A rectangle in the first quadrant has one vertex on the line $y = 10 - 2x$, another at the origin, one on the positive x -axis, and one on the positive y -axis. (See the figure.)

a) Express the area A of the rectangle as a function of x .

b) What's the domain of $A(x)$?

c) What value of x produces the maximum area?

d) What is the maximum area?

