

## Math 165

### Review Sheet 1 Answers

1. Domain =  $\{x \in \mathbb{R} | x < -1 \text{ or } x > 2\}$ .
2.  $(f \circ g)(x) = \frac{\frac{1}{x} - 1}{\frac{1}{x} - 2} = \frac{1 - x}{1 - 2x}$   
Domain =  $\{x \in \mathbb{R} | x \neq 0 \text{ and } x \neq \frac{1}{2}\}$ .
3.  $\frac{128}{x} + x^2$ .
4.  $g(x) = 1 - x^3$  and  $f(x) = \sqrt[3]{x}$ .
5. b) 3, -1, DNE, 1, 3, DNE.
6.  $-\infty$
7.  $x = 1$  and  $x = -1$ .
8.  $\frac{-3}{11}$
9.  $\frac{-1}{8}$
10. 0
11.  $\frac{3}{2}$
12. a)  $\lim_{x \rightarrow 2^-} f(x) = 4$ ,  $\lim_{x \rightarrow 2^+} f(x) = 4$  and  $f(2) = 4$ , therefore  $f(x)$  is continuous at  $x = 2$ .  
b)  $\lim_{x \rightarrow 0^-} f(x) = -2$ ,  $\lim_{x \rightarrow 0^+} f(x) = 2$ , therefore  $f(x)$  is not continuous at  $x = 0$ .
13. Let  $f(x) = x^3 + 2x + 1$ . Since  $f$  is continuous (a polynomial),  $f(0) = 1$  and  $f(-1) = -2$ . So, by the intermediate value theorem, there is a solution to the equation in the interval  $[-1, 0]$ .
14.  $a = 2$
- 15.
16.  $f$  is not differentiable at  $x = a, d$ , and  $e$  (not continuous)
17. a) -32 feet per second.  
b) -24 feet per second.
18. a) Slope is  $2 - \sqrt{3}$ .  
b)  $m = \frac{1}{4}$ , equation:  $4y = x + 5$ .
19.  $f'(x) = \frac{1}{(x+1)^2}$
20.  $\delta = \epsilon/5$