

## Math 150 Exam 1 Review Answer Key

1. (a) Start with  $f(x) = |x|$ , shift right 2, vertically shrink by  $\frac{1}{2}$ , and reflect across the  $x$ -axis.  
 (b) Start with  $f(x) = \sqrt{x}$ , shift left 3, vertically stretch by 3, shift up 2.
2.  $g(x) = 5f(-\frac{1}{5}x) - 4$
3. (a) Neither  
 (b) Even
4.  $f(x) = -3(x + 3)^2 - 4$ ; Vertex:  $(-3, -4)$ ; Maximum value is  $-4$ .
5. Minimum value is  $\frac{11}{5}$ ; Range:  $[\frac{11}{5}, \infty)$
6. (a)  $(-\infty, -2) \cup (1, \infty)$   
 (b)  $[-3, 4) \cup (4, 5) \cup (5, \infty)$   
 (c)  $[-3, -2) \cup (1, 4) \cup (4, 5) \cup (5, \infty)$   
 (d)  $(f + g)(2) = \frac{1}{2} + \frac{\sqrt{5}}{6} = \frac{3 + \sqrt{5}}{6}$ ;  $(fg)(6) = \frac{3}{4\sqrt{10}} = \frac{3\sqrt{10}}{40}$   
 (e)  $(\frac{f}{g})(x) = \frac{x^2 - 9x + 20}{\sqrt{(x^2 + x - 2)(x + 3)}}$ ; Domain:  $(-3, -2) \cup (1, 4) \cup (4, 5) \cup (5, \infty)$
7. (a)  $(f \circ g)(x) = \frac{x - 1}{x + 5}$ ; Domain:  $(-\infty, -5) \cup (-5, \infty)$   
 (b)  $(f \circ f)(x) = \frac{x}{7x + 36}$ ; Domain:  $(-\infty, -6) \cup (-6, -\frac{36}{7}) \cup (-\frac{36}{7}, \infty)$
8. (a)  $(f \circ g)(x) = 8x^6 + 8x^4 - 6x^3 + 2x^2 - 3x$   
 (b)  $(g \circ f)(x) = 16x^6 - 72x^5 + 108x^4 - 54x^3 + 2x^2 - 3x$
9. (a) Is a function; Not one-to-one  
 (b) Not a function  
 (c) Is a function; Is one-to-one
10. (a)  $f^{-1}(x) = \sqrt[5]{x^3 - 9}$   
 (b)  $f^{-1}(x) = \frac{-4x}{x - 1} = \frac{4x}{1 - x}$
11. (a)  $T(x) = \frac{\sqrt{x^2 - 12x + 40}}{3} + \frac{x}{5}$   
 (b) Minimum time is about 1.73 hours when  $x = 4.50$  miles
12. (a)  $C(t) = \frac{200 + 8t}{2000 + 10t}$  (where  $C$  is the concentration as a decimal.)  
 (b) When  $t = 500$  seconds
13.  $\frac{6h + 35}{6(6 + h)}$
14. (a)  $x = \frac{-1 \pm \sqrt{7}}{3}$   
 (b)  $x = -\frac{5}{2}$   
 (c)  $x = \pm \frac{2}{3}, 2$

- (d)  $x = 5, 7$
- (e)  $x = \frac{9}{16}$
- 15. (a)  $(-\frac{3}{2}, \frac{1}{2}]$   
(b)  $(-\infty, \frac{3}{2}] \cup [\frac{13}{6}, \infty)$
- 16.  $\frac{125x^{21}y^6}{z^{12}}$
- 17.  $9|x|^3y^2\sqrt[6]{27x^4y^2}$
- 18. Center:  $(-4, 5)$ ; Radius: 2
- 19. (a)  $2\sqrt{29}$   
(b)  $y = -\frac{5}{8}x + \frac{27}{8}$
- 20. (a)  $(-2.2066, 0)$  and  $(-0.8368, 0)$   
(b) On the intervals  $(-\infty, -1.6618) \cup (0.1649, 1.5125)$   
(c)  $[-4.5916, \infty)$   
(d)  $x = -1.9739, -1.2515$
- 21. (a) False  
(b) False  
(c) True  
(d) True