

## Math 150 Exam 1 Review Answer Key

1. (a)  $(-\infty, -2) \cup (1, \infty)$   
 (b)  $(-\infty, 4) \cup (4, 5) \cup (5, \infty)$   
 (c)  $(-\infty, -2) \cup (1, 4) \cup (4, 5) \cup (5, \infty)$   
 (d)  $(f + g)(2) = \frac{1}{3}, (f - g)(-3) = \frac{17}{28}, (fg)(3) = 0$   
 (e)  $\left(\frac{f}{g}\right)(x) = \frac{x^2 - 9x + 20}{(x - 3)\sqrt{x^2 + x - 2}}$ ; Domain:  $(-\infty, -2) \cup (1, 3) \cup (3, 4) \cup (4, 5) \cup (5, \infty)$
2. (a)  $(g \circ f)(x) = -\frac{6}{x + 6}$ ; Domain:  $(-\infty, -6) \cup (-6, \infty)$   
 (b)  $(f \circ g)(x) = \frac{x - 1}{x + 5}$ ; Domain:  $(-\infty, -5) \cup (-5, \infty)$   
 (c)  $(f \circ f)(x) = \frac{x}{7x + 36}$ ; Domain:  $(-\infty, -6) \cup (-6, -\frac{36}{7}) \cup (-\frac{36}{7}, \infty)$
3. (a)  $(f \circ g)(x) = x^6 + 2x^3 - 1$   
 (b)  $(g \circ f)(x) = x^6 - 6x^4 + 12x^2 - 7$
4. (a) No  
 (b) Yes  
 (c) No
5. Show that  $f(g(x)) = x$  and  $g(f(x)) = x$ . See Full Solutions.
6.  $f^{-1}(x) = \sqrt[5]{x^3 - 9}$
7. (a) Shift left 4, vertically shrink by a factor of  $\frac{2}{3}$ , reflect across the  $x$  axis, shift up 7  
 (b) Horizontally shrink by a factor of  $\frac{1}{3}$ , reflect across the  $y$  axis, vertically stretch by a factor of 4, reflect across the  $x$  axis, shift down 9
8. Standard Form:  $f(x) = 4(x + \frac{3}{2})^2 - 4$   
 Vertex:  $(-\frac{3}{2}, -4)$   
 The minimum value of  $f$  is  $-4$  and it occurs when  $x = -\frac{3}{2}$ .  
 $x$ -intercepts:  $x = -\frac{1}{2}, -\frac{5}{2}$ ;  $y$ -intercept:  $y = 5$
9. (a)  $R(x) = -\frac{1}{5}x^2 + 406x$   
 (b) Maximum revenue is achieved when the rent is \$1015.
10.  $T(x) = \frac{\sqrt{x^2 - 12x + 40}}{3} + \frac{x}{5}$
11.  $-\frac{1}{5(5 + h)}$
12. (a)  $x = \frac{-1 \pm \sqrt{7}}{3}$   
 (b)  $x = \frac{16}{81}$  ( $x = 16$  is extraneous.)

(c)  $x = 2, \pm \frac{2}{3}$

13.  $(-\infty, -\frac{3}{2}) \cup (2, \frac{11}{2}]$

14.  $\frac{125x^{21}y^6}{z^{12}}$

15. Center:  $(-4, 5)$ ; Radius: 2

16. (a)  $2\sqrt{29}$

(b)  $y = -\frac{5}{8}x + \frac{27}{8}$

17. (a) True

(b) True

(c) False

(d) False

(e) True

(f) False

(g) False