

## Math 150 Week in Review 5 Answer Key

1. (a) As  $x \rightarrow \infty, y \rightarrow \infty$ ; As  $x \rightarrow -\infty, y \rightarrow \infty$   
 (b) As  $x \rightarrow \infty, y \rightarrow -\infty$ ; As  $x \rightarrow -\infty, y \rightarrow \infty$
2. (a)  $x$ -intercepts:  $(-2, 0), (0, 0), (\frac{5}{2}, 0)$   
 $y$ -intercept:  $(0, 0)$   
 End behavior: As  $x \rightarrow \infty, y \rightarrow \infty$ ; As  $x \rightarrow -\infty, y \rightarrow -\infty$   
 Graph is positive (above  $x$ -axis) on  $(-2, 0) \cup (\frac{5}{2}, \infty)$ .  
 Graph is negative (below  $x$ -axis) on  $(-\infty, -2) \cup (0, \frac{5}{2})$ .  
 (b)  $x$ -intercepts:  $(-1, 0), (1, 0), (3, 0)$   
 $y$ -intercept:  $(0, 3)$   
 End behavior: As  $x \rightarrow \infty, y \rightarrow -\infty$ ; As  $x \rightarrow -\infty, y \rightarrow -\infty$   
 Graph is positive (above  $x$ -axis) on  $(-1, 1) \cup (1, 3)$ .  
 Graph is negative (below  $x$ -axis) on  $(-\infty, -1) \cup (3, \infty)$ .
3. (a)  $Q(x) = 2x^3 + 4x^2 + 10x + 16$ ;  $R(x) = 16x - 13$   
 (b)  $Q(x) = -\frac{3}{2}x^2 - \frac{3}{4}x - \frac{13}{8}$ ;  $R(x) = \frac{7}{8}$
4.  $P(x) = -3x^4 + 9x^3 + 9x^2 - 33x + 18$
5. (a)  $-1$   
 (b)  $(-10 + 6\sqrt{3}) + (6 + 10\sqrt{3})i$   
 (c)  $\frac{34}{29} + \frac{27}{29}i$
6.  $x = \frac{1}{3} \pm \frac{\sqrt{2}}{3}i$
7. (a)  $x$ -intercept:  $(2, 0)$   
 $y$ -intercept:  $(0, -2)$   
 Vertical Asymptote:  $x = -\frac{3}{2}$   
 Horizontal Asymptote:  $y = \frac{3}{2}$   
 Holes at  $x = -2, \frac{1}{2}$   
 (b)  $x$ -intercepts:  $(-4, 0), (0, 0), (2, 0)$   
 $y$ -intercept:  $(0, 0)$   
 Vertical Asymptotes:  $x = -1, x = 5$   
 Horizontal Asymptote: None  
 Holes: None
8. (a)  $x$ -intercepts:  $(-3, 0), (-1, 0)$   
 $y$ -intercept:  $(0, -\frac{3}{2})$   
 Vertical Asymptotes:  $x = 4, x = 1$   
 Horizontal Asymptote:  $y = -2$   
 Hole at  $x = -4$   
 Graph is positive (above  $x$ -axis) on  $(-3, -1) \cup (1, 4)$ .  
 Graph is negative (below  $x$ -axis) on  $(-\infty, -3) \cup (-1, 1) \cup (4, \infty)$ .  
 Asymptotic Behavior:  
 As  $x \rightarrow 1^-, y \rightarrow -\infty$ ; As  $x \rightarrow 1^+, y \rightarrow \infty$   
 As  $x \rightarrow 4^-, y \rightarrow \infty$ ; As  $x \rightarrow 4^+, y \rightarrow -\infty$   
 As  $x \rightarrow -\infty, y \rightarrow -2$ ; As  $x \rightarrow \infty, y \rightarrow -2$

- (b)  $x$ -intercepts:  $(-4, 0), (2, 0)$   
 $y$ -intercept:  $(0, -\frac{16}{75})$   
Vertical Asymptotes:  $x = -5, x = -1, x = 3$   
Horizontal Asymptote:  $y = 0$   
Holes: None  
Graph is positive (above  $x$ -axis) on  $(-4, -1) \cup (3, \infty)$ .  
Graph is negative (below  $x$ -axis) on  $(-\infty, -5) \cup (-5, -4) \cup (-1, 2) \cup (2, 3)$ .  
Asymptotic Behavior:  
As  $x \rightarrow -5^-$ ,  $y \rightarrow -\infty$ ; As  $x \rightarrow -5^+$ ,  $y \rightarrow -\infty$   
As  $x \rightarrow -1^-$ ,  $y \rightarrow \infty$ ; As  $x \rightarrow -1^+$ ,  $y \rightarrow -\infty$   
As  $x \rightarrow 3^-$ ,  $y \rightarrow -\infty$ ; As  $x \rightarrow 3^+$ ,  $y \rightarrow \infty$   
As  $x \rightarrow -\infty$ ,  $y \rightarrow 0$ ; As  $x \rightarrow \infty$ ,  $y \rightarrow 0$

9. Problem 7b has a slant asymptote; Slant Asymptote:  $y = \frac{x}{2} + 3$

10.  $Q(x) = x^2 - 3x + 1, R(x) = -8$

11.  $P(x) = 2(x - \frac{5}{2})(x + 3)(x - 2) = (2x - 5)(x + 3)(x - 2)$