

## SEMESTER EXAM REVIEW KEY

1. (a)  $f(x) = \frac{1}{x}$   
 (b)  $T(x,y)=(x-2,y-3)$
2. (a)  $f(x) = |x|$   
 (b)  $T(x,y)=(x-3,y+1)$   
 $S(x,y)=(x,-2y)$
3. (a)  $f(x) = x^2$   
 (b)  $T(x,y)=(x-1,y+4)$   
 $S(x,y)=(x,-2y)$   
 vertex(-1,4)  
 axis:  $x = -1$
4. (a)  $f(x) = x^2$   
 (b)  $T(x,y)=(x-4,y-5)$   
 vertex(-4,-5)  
 axis:  $x = -4$

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5. (a)  $f(x) = \log x$   
 (b)  $T(x,y)=(x+2,y)$
6. (a)  $f(x) = \ln x$   
 (b)  $T(x,y)=(x+1,y-3)$   
 $S(x,y)=(-x,y)$
7. (a)  $f(x) = 3^x$   
 (b)  $T(x,y)=(x-2,y)$
8.  $y \leq 3$
9.  $x = -\frac{9}{5}$
10.  $x < 0.4$  or  $x > 4.6$
11.  $-6 \leq x \leq 14$
12.  $x = -\frac{5}{3}$
13.  $x = \frac{7}{8} \pm \frac{i\sqrt{31}}{8}$
14.  $-3 < x \leq 2$
15.  $(-\infty, -3) \cup [-1/2, 1)$
16.  $[0, \infty)$
17.  $(-\infty, -13) \cup (-1, 5)$
18.  $u^2v^4$
19.  $\frac{6}{ab^4}$
20. (a)  $5x - y - 19 = 0$   
 (b)  $x + 5y + 17 = 0$
21.  $(-\infty, \infty)$
22.  $[0, 5) \cup (5, \infty)$
23.  $f(-x) = 3(-x)^3 - 2(-x)$   
 $= -3x^3 + 2x$   
 $\therefore f(x)$  is odd
24.  $f(-x) = -2(-x)^4 - 4(-x) + 7$   
 $= -2x^4 + 4x + 7$
- $\therefore f(x)$  is neither
25. 1
26.  $2x^2 - 16x + 29$
27.  $x^2 - 6x + 13$
28.  $2x^3 - 19x^2 + 56x - 48$
29.  $f^{-1}(x) = \sqrt[3]{x-2}$
30.  $f(g(x)) = 2\left(\frac{x-8}{2}\right) + 8$   
 $= x - 8 + 8 = x$   
 $g(f(x)) = \frac{2x + 8 - 8}{2}$   
 $= \frac{2x}{2} = x$   
 $\therefore f(x)$  &  $g(x)$  are inverses of each other
31.  $\lim_{x \rightarrow \infty} f(x) = -\infty$   
 $\lim_{x \rightarrow -\infty} f(x) = \infty$
32.  $\lim_{x \rightarrow \infty} f(x) = \infty$   
 $\lim_{x \rightarrow -\infty} f(x) = \infty$
33.  $x = -\frac{5}{3}, 1$
34.  $x = 0, -6, 6$
35.  $f(x) = (x-2)(x^2 + x + 1)$   
 $x = 2, -\frac{1}{2} \pm \frac{i\sqrt{3}}{2}$
36.  $f(x) = (x-1)(x+4)(x^2 + 1)$   
 $x = 1, -4, \pm i$
37. VA:  $x = 3$  HA:  $y = 4$   
 $x$ -int: 1.25  $y$ -int:  $5/3$   
 Domain:  $(-\infty, 3) \cup (3, \infty)$
38. VA:  $x = 3, -2$  HA:  $y = 2$   
 $x$ -int: 0  $y$ -int: 0  
 Domain:  $(-\infty, -2) \cup (-2, 3) \cup (3, \infty)$
39. (a) 4 (b) 0 (c) -1  
 (d)  $\frac{1}{4}$  (e) -1 (g) 7
40.  $\approx 1.4$
41. -3, 1
42. max(-2.23, 12.24) min(0.9, -3.05)  
 inc:  $(-\infty, -2.23)$  &  $(0.9, \infty)$   
 dec.  $(-2.23, 0.9)$
43. yes, non-removable  
 (infinite discontinuity)

44. yes, removable, hole @  $x=0$

45. continuous

46. discontinuous

47. \$7310 @ 7.8%

\$2690 @ 3.6%

48. \$29,000

49. 15 L @ 20%

10 L @ 35%

50.  $6x + 7y + 32 = 0$

51.  $R = \frac{kl}{D^2}$ ;  $R = 3.6$

52. (a)  $y = 231.2x^{-0.3}$

(b)  $\approx 110$  beats/min

53.  $(2x + 1)(3x^2 - 4x + 2) + 7$

$= 6x^3 - 5x^2 + 9$ ; no

54.  $(x - 5)(x^2 + x - 2)$

$= x^3 - 4x^2 - 7x + 10$ ; yes

55.  $f(x) = 3x^3 - 10x^2 - 27x + 10$

56.  $f(x) = x^3 - 3x^2 + x + 5$

57.  $-\frac{2}{13} + \frac{16i}{13}$

58.  $\approx 19.8$  years

59.  $\approx 22.76$  days

60. (a) \$3623.85

(b) \$3645.93

61. (a)  $2\log_3 a + \log_3 b$

(b)  $\frac{1}{2}\log_3 a - \log_3 b - \log_3 c$

62. (a)  $\log\left(\frac{r^2 w^3}{q}\right)$

(b)  $\log\left(\frac{3}{16}\right)$

63.  $\approx 1.59$

64.  $\frac{1}{100}$

65.  $\approx 0.53$

66.  $x = -\frac{79}{3}$

67.  $x = 4, -25$

68.  $x = -\frac{5}{3}$

