Review 3 Answers

1. (a) Zeros: -3 (mult. 4), 0 (mult. 1), 3 (mult. 1). The graph rises to the left and to the right, crosses at 0 and 3 but touches at -3.
(b) Zeros: 0 (mult. 1), -1 (mult. 1), $\frac{1}{2}$ (mult. 1). The graph falls to the left and rises to the right, crosses at each zero.
(c) Zeros: 1 (mult. 1), -2 (mult. 2). The graph rises to the left and falls to the right, crosses at 1 and touches at -2.

2. (a) Domain: $(-\infty,-4)\cup(-4,3)\cup(3,\infty)$, Intercepts: $(0,0),(2,0)$, VA: $x=-4$, $x=3$, HA: $y=3$, no holes; (b) Domain: $(-\infty,-1)\cup(-1,2)\cup(2,\infty)$, Intercepts: $(-3,0)$, $\left(0,-\frac{3}{2}\right)$, VA: $x=2$, HA: $y=1$, hole at $\left(-1,-\frac{2}{3}\right)$.

3. (a) $(8,6)$; (b) $\varnothing$, inconsistent system; (c) The system is dependent; there are infinitely many solutions of the form $(x,3+\frac{3}{4}x)$.

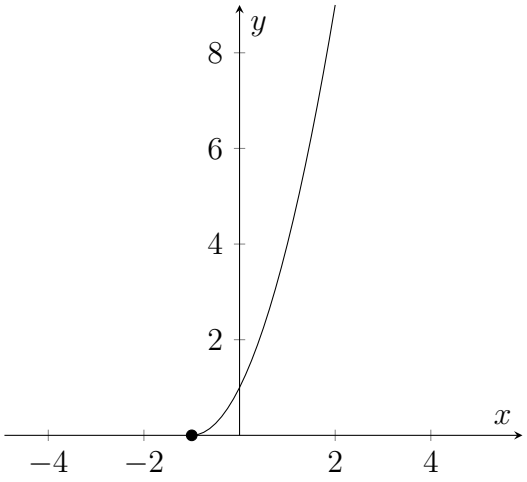
4. 80 recordable CDs, 20 play-only CDs

5. (a) $(fg)(x)=\dfrac{\sqrt{1-x}}{x^2}$, domain: $(-\infty,0)\cup(0,1]$;
$\left(\dfrac{f}{g}\right)(x)=\dfrac{1}{x^2\sqrt{1-x}}$, domain: $(-\infty,0)\cup(0,1)$
(b) $\dfrac{1}{18}$
(c) $(f\circ g)(x)=\dfrac{1}{1-x}$, domain: $(-\infty,1)$;
(d) 1

6. $f(x)=x^{3/2}$ and $g(x)=x^2+4$ (other answers are possible)

7. $(f\circ f)(x)=\dfrac{2x-2}{3-x}$, domain: $(-\infty,1)\cup(1,3)\cup(3,\infty)$

8. (a) Yes; (b) No; (c) Yes; (d) No.

9. 

10. 2

11. Verify that $(f \circ g)(x) = x$ and $(g \circ f)(x) = x$.

12. (a) $f^{-1}(x) = \dfrac{-2x-5}{x-1}$, domain: $(-\infty, 1) \cup (1, \infty)$
(b)$f^{-1}(x) = (x-2)^2 - 1$, domain: $[2, \infty)$
(c)$f^{-1}(x) = \dfrac{1}{x}$, domain: $(-\infty, 0) \cup (0, \infty)$

13. Range of f = domain of $f^{-1} = (-\infty, 1) \cup (1, \infty)$

14. Domain: $(-\infty, \infty)$, Range: $(-\infty, 2)$, HA: $y = 2$, points $(-2, -2)$ and $(-1, 1)$, increasing.

15. Domain: $(1, \infty)$, Range: $(-\infty, \infty)$, VA: $x = 1$, x-intercept $(10, 0)$, no y-intercept.

16. $f^{-1}(x) = e^{x/2} - 5$

17. (a) $\dfrac{1}{2}$ (b) -1 (c) $-\dfrac{1}{6}$ (d) 3 (e) -3

18. (a) $\log\left(\dfrac{32y^2}{3x^3}\right)$ (b) $\log_2\left(\dfrac{4x^2}{y\sqrt{z}}\right)$

19. $2 + \dfrac{1}{2}\ln x + \dfrac{3}{2}\ln y - 2\ln z$

20. (a) $\dfrac{\ln 33}{\ln 2}$ (b) $\ln 5$ (c) $\dfrac{\ln 20}{\ln(5/4)}$ (d) $\dfrac{3\ln 6}{\ln 4}$
(e) $\ln 3$ (f) $\emptyset$ (g) $4 - 2e$ (h) -3 (i) $\emptyset$

21. (a) $-1, 7$ (b) $\dfrac{10}{7}$ (c) 3
(d) 87 (e) 2

22. 980 bats