

Solutions For the Old Exams Problems

1 Section 4.2

- $g(x) = -\left(\frac{1}{3}\right)^x + 3$
 - Range $(-\infty, 3)$.
 - Asymptote $y = 3$
- $f(x) = \left(\frac{1}{3}\right)^{x-2} - 1$
 - Translation: 2 units to the right and 1 unit down.
 - $(0, 8)$ is a y-intercept and $(2, 0)$ is an x-intercept.
- $f(x) = -\left(\frac{2}{3}\right)^x + 2$
 - f is an increasing function.
 - Y-intercept $(0, 1)$.
- $8e^{-2x}(e^{4x} + 1)$.
- $y = 2^x$.
- $f(6) = 27$
- $k = 9$ and $a = \frac{1}{3}$.
- Domain $(-\infty, \infty)$ and Range $[1, \infty)$.
- $(-\infty, 0) \cup (2, \infty)$.
- e

2 Section 4.3

- $f(x) = \log_{\frac{1}{2}}(3 - x)$
 - Domain $(-\infty, 3)$ Range $(-\infty, \infty)$ Asymptote $x = 3$
 - $f^{-1}(x) = -\left(\frac{1}{2}\right)^x + 3$.
- $x = a^y + 1$
- $f(x) = -\log_{\frac{1}{2}}(x + 9) - 1$
 - X-intercept $(-6, 0)$ Y-intercept $(0, 1)$
 - Domain $(-9, \infty)$ Range $(-\infty, \infty)$
 - Asymptote $x = -9$

4. $f(x) = -\frac{1}{2} + \log_9(1 - 2x)$
 - (a) Domain $(-\infty, \frac{1}{2})$ Range $(-\infty, \infty)$
 - (b) Asymptote $x = \frac{1}{2}$
 - (c) X-intercept $(-1, 0)$ Y-intercept $(0, -\frac{1}{2})$
5. Domain $(-\infty, 0) \cup (0, \infty)$ Range $(-\infty, 1]$
6. d
7. Domain $(-1, 1)$
8. X-intercept $(4, 0)$ Y-intercept $(0, -2)$
9. $f^{-1}(-2) = \frac{11}{2}$
10. d
11. c
12. b
13. b
14. d
15. a
16. $f(4) = 6$

3 Section 4.4

1. $f(2 \ln 3) = \frac{80}{9}$
2. (a) $\log_2(xy^3z^7)$
 - (b) $\log_2 \frac{2y}{x}$
 - (c) $\log_3 \frac{3x^5z^2}{y^4}$
 - (d) $\log_2 \frac{zx^3}{y^2}$
3. (a) 4
 - (b) 2
 - (c) $\frac{13}{10}$
 - (d) $\frac{-2}{9}$
 - (e) 1
 - (f) 3
 - (g) $\frac{15}{8}$

- (h) 2
- (i) $\frac{1}{5}$
- 4. (a) $2x + 2y - 2$
(b) $y - 2x + 2$
- 5. $4 + 2y + 4x$
- 6. $\frac{1}{2}$
- 7. $3x + 4y$
- 8. $4 + \frac{3}{2}x$
- 9. (a) $\frac{5}{36}$
(b) $\frac{-1}{4}$
- 10. 4
- 11. $\frac{a+b+1}{2a}$
- 12. -6
- 13. $\frac{x}{y-x}$
- 14. 2
- 15. $\ln a$
- 16. 3
- 17. 2
- 18. $\log_{\frac{1}{a}} x$
- 19. b
- 20. d
- 21. e
- 22. (a) $(-4, -3)$
(b) $(3, \infty)$
(c) $(-4, 0) \cup (0, 4)$
(d) $(0, 1)$
(e) $(0, 1) \cup (4, \infty)$
(f) $(0, \frac{1}{2})$

4 Section 4.5

1. (a) 2
(b) 1
(c) $\{2, \log_2 3\}$
(d) $\frac{-5}{3}$
(e) $\frac{\ln 2}{2 \ln 5}$
(f) 2
(g) $\{0, 1\}$
(h) $\frac{9}{5}$
(i) $\{-1, 2\}$
(j) -4
(k) $\{\ln 2, \ln 3\}$
(l) ϕ
(m) 2
(n) $\frac{5 \pm \sqrt{17}}{2}$
(o) $\ln 2$
2. (a) 3
(b) 4
(c) ϕ
(d) 3
(e) ϕ
(f) -3
(g) 4
(h) 25
(i) $\{1, 100\}$
(j) $\frac{1}{8}$
(k) 125
(l) $\sqrt{3}$
(m) ϕ
(n) 2
(o) 11
(p) $\{10, 100\}$
(q) 2
(r) -2

(s) $\{1, e^{-1}\}$

(t) $\frac{-1}{6}$

(u) 4

(v) 8

(w) $\{e, e^2\}$

3. Product = 14

4. -8

5. $t = \frac{x+y}{2y-x}$

6. $x = e^{y-1} + 3$

7. $x = \frac{1}{2} \log \frac{1+t}{1-t}$

8. $\frac{1}{8} P_0$

9. $\sqrt{2}$

10. $\{0, 2\}$