Solve.

1. $-\frac{5}{6}x = 7$ [A] $-\frac{30}{7}$ [B] $\frac{1}{5}$ [C] $-\frac{42}{5}$ [D] $-\frac{1}{7}$

2. $x^3 + 2x^2 - 9x - 18 = 0$ [A] 2, 3 [B] $\pm 3,\ -2$ [C] –2, 9 [D] $\pm 3,\ 2$

3. $\sqrt{x+9} - 3 = x$ [A] 0 [B] –5 [C] –5, 7 [D] 7

4. Solve the equation. $-\frac{1}{b} - 2 = \frac{1}{3}$ [A] $\frac{3}{8}$ [B] $-2\frac{1}{3}$ [C] $2\frac{2}{3}$ [D] $-\frac{3}{7}$

5. Solve: $5\sqrt{x} - 2x - 2 = 0$ [A] $\frac{1}{6},\ 4$ [B] $\frac{1}{4},\ 4$ [C] $\frac{1}{4},\ 5$ [D] $-\frac{1}{4},\ -4$

6. Solve:
   $-6 + n < 14$
   [A] $\{n \mid n > 8\}$ [B] $\{n \mid n > 20\}$ [C] $\{n \mid n < 8\}$ [D] $\{n \mid n < 20\}$

Solve.

7. $|5x + 4| < 5$

   [A] $\left\{x \mid -\frac{9}{5} < x < \frac{1}{5}\right\}$ [B] $\left\{x \mid x \le -\frac{9}{5} \text{ or } x \ge \frac{1}{5}\right\}$

   [C] $\left\{x \mid -\frac{9}{5} \le x \le \frac{1}{5}\right\}$ [D] none of these

8. $(x+7)(2x-3) \le 0$

   [A] $\left\{x \mid x \le -\frac{3}{2} \text{ or } x \ge 7\right\}$ [B] $\left\{x \mid -\frac{3}{2} \le x \le 7\right\}$

   [C] $\left\{x \mid -7 \le x \le \frac{3}{2}\right\}$ [D] $\left\{x \mid x \le -7 \text{ or } x \ge \frac{3}{2}\right\}$

9. Find the standard form of the equation of the specified circle.
Center: $(-3, 3)$; Radius: $6\sqrt{5}$

[A] $(x+3)^2+(y-3)^2=36\sqrt{5}$ [B] $(x-3)^2+(y+3)^2=180$

[C] $(x-3)^2+(y+3)^2=36\sqrt{5}$ [D] None of these

10. Evaluate the function and simplify the results.

$$f(x)=\begin{cases}\frac{1}{2}x & \text{if } x<-4\\ -5-4x^2 & \text{if } x\geq -4\end{cases}$$

a. $f(-4)$ b. $f(0)$
c. $f(1)$ d. $f(-3.9)$

[A] a. -69 b. 0
c. $\frac{1}{2}$ d. -65.84

[B] a. -2 b. 0
c. $\frac{1}{2}$ d. -2

[C] a. -2 b. -5
c. -9 d. -2

[D] a. -69 b. -5
c. -9 d. -65.84

11. Which shows the equation of a line, in slope-intercept form, that passes through the point $(6, -4)$ with slope 2?

[A] $y=-2x-16$ [B] $y=2x-2$ [C] $y=2x-16$ [D] $y=-2x-2$

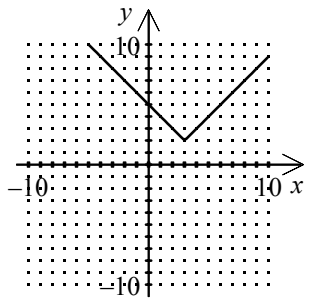
12. State whether the function has a minimum or a maximum value and find the value.
$f(x)=-6x^2-30x$

[A] minimum: -2.5 [B] maximum: 37.5

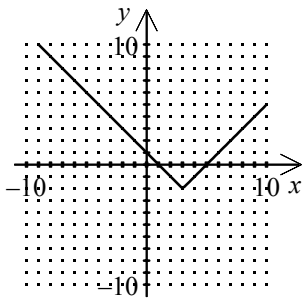
[C] minimum: 37.5 [D] maximum: -2.5

13. Use the graph of $f(x) = |x|$ to identify the graph of $f(x) = |x-3| - 2$.

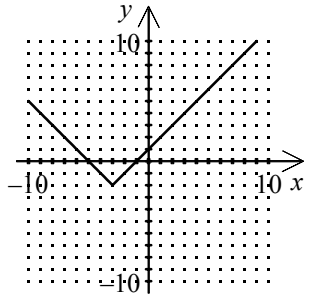
[A]



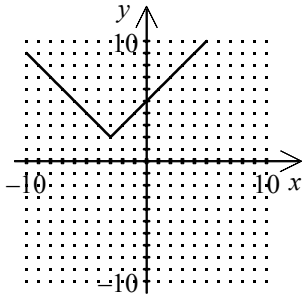
[B]



[C]



[D]



14. Given $f(x) = \dfrac{7}{x+4}$ and $g(x) = \dfrac{2}{x-4}$, find $(f+g)(x)$.

[A] $\dfrac{-9x+20}{(x+4)(x-4)}$, $x \neq -4,\ 4$

[B] $\dfrac{9}{2x}$, $x \neq 0$

[C] $\dfrac{9x-20}{(x+4)(x-4)}$, $x \neq -4,\ 4$

[D] $\dfrac{5}{2x}$, $x \neq 0$

15. Find $(g \circ f)(x)$ and $(f \circ g)(x)$ for $f(x) = x+5$ and $g(x) = \sqrt{x+4}$.

[A] $(g \circ f)(x) = \sqrt{x+4} + 5$
$(f \circ g)(x) = \sqrt{x+9}$

[B] $(g \circ f)(x) = \sqrt{x+5} - 4$
$(f \circ g)(x) = \sqrt{x+4} + 9$

[C] $(g \circ f)(x) = \sqrt{x+4}$
$(f \circ g)(x) = \sqrt{x+5} - 4$

[D] $(g \circ f)(x) = \sqrt{x+9}$
$(f \circ g)(x) = \sqrt{x+4} + 5$

16. Find all relative extrema of the function.
$f(x) = 8x^3 - 3x^4$

[A] relative maximum: $(-2,\ -16)$
relative minimum: $(0,\ 0)$

[B] relative maximum: $(2,\ 16)$
relative minimum: none

[C] relative maximum: none
relative minimum: $(2,\ 16)$

[D] The function has no relative extrema.

17. Find all real zeros of the function.
$f(x) = -4x^4 + 256x^2$

[A] $x = 0,\ x = \pm 64$

[B] $x = 0,\ x = 64$

[C] $x = 0,\ x = 8$

[D] $x = 0,\ x = \pm 8$

[E] None of these

Find all the zeros of the function.

18. $f(x) = 10x^4 - 9x^3 - 8x^2 + 9x - 2$

[A] $-1,\ 1,\ 2,\ \frac{2}{5}$

[B] $-1,\ 1,\ \frac{1}{2},\ \frac{2}{5}$

[C] $-1,\ 1,\ 2,\ -\frac{5}{2}$

[D] $-1,\ 1,\ -2,\ \frac{5}{2}$

19. $f(x) = x^4 - 6x^3 + 13x^2 + 6x - 14$

[A] $1,\ -1,\ 3+\sqrt{5}i,\ 3-\sqrt{5}i$

[B] $-5,\ 5,\ 3+\sqrt{5}i,\ 3-\sqrt{5}i$

[C] $1,\ -1,\ -3+\sqrt{5}i,\ -3-\sqrt{5}i$

[D] $3,\ -3,\ -3+\sqrt{5}i,\ -3-\sqrt{5}i$

20. Find the vertical and horizontal asymptotes for the rational function.
$f(x) = \dfrac{3x^2 - 3x - 1}{x^2 - x - 2}$

[A] $x = -2,\ x = 3,\ y = 3$

[B] $x = -3,\ x = -3,\ y = 2$

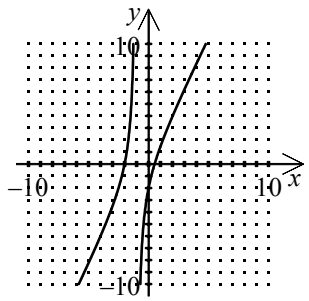
[C] $x = -2,\ x = 1,\ y = 2$

[D] $x = -1,\ x = 2,\ y = 3$

21. Identify the graph of the rational function and find the equation of the slant asymptote.

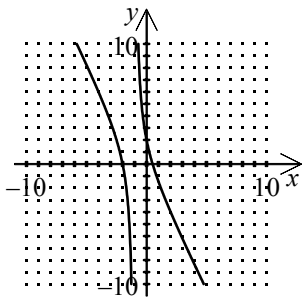
$$f(x) = \frac{-2x^2 - 3x + 2}{x + 1}$$

[A]



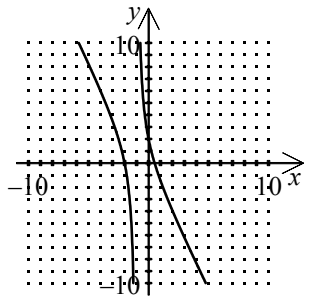
Slant asymptote: $y = 2x + 1$

[B]



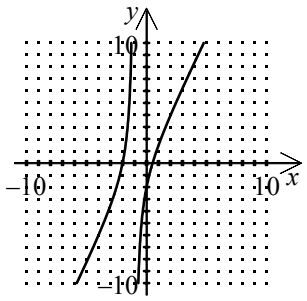
Slant asymptote: $y = 2x + 1$

[C]



Slant asymptote: $y = -2x - 1$

[D]

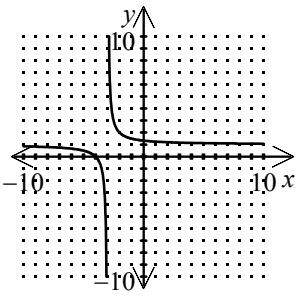


Slant asymptote: $y = -2x - 1$

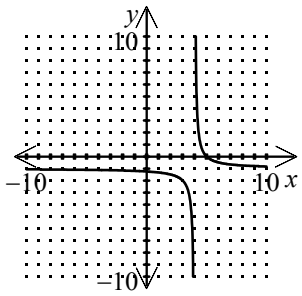
22. Graph:

$$f(x)=\frac{x-3}{x^2+x-12}$$

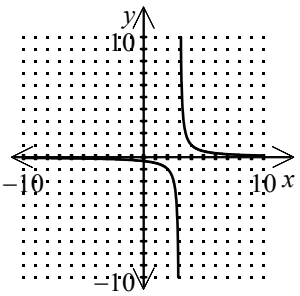
[A]



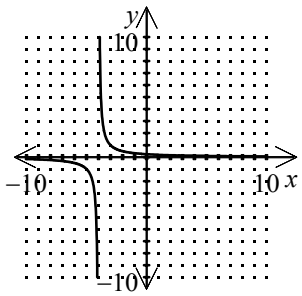
[B]



[C]



[D]



23. Find the inverse of the function.

$$f(x)=(x-2)^3+4$$

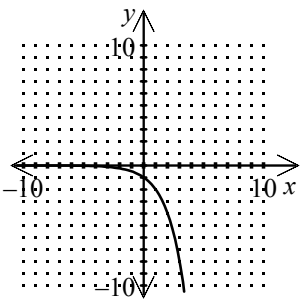
[A] $f^{-1}(x)=\sqrt[3]{x-4}+2$

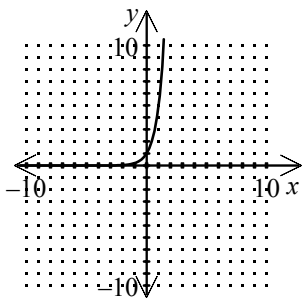
[B] $f^{-1}(x)=\sqrt[3]{x-6}$

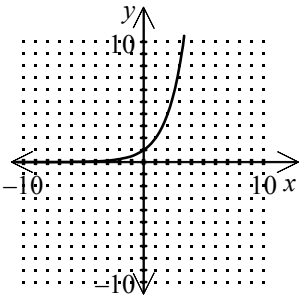
[C] $f^{-1}(x)=\sqrt[3]{x+2}-4$

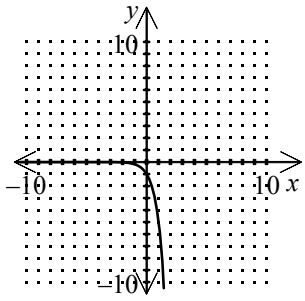
[D] None of these

24. Identify the graph of the function.
$f(x) = 2^x$

[A] 

[B] 

[C] 

[D] 

25. Evaluate the expression without using a calculator.
$\log_3\left(\frac{1}{9}\right)$

[A] $\frac{1}{2}$ [B] $\frac{1}{6}$ [C] –6 [D] –2

Solve for *x*.

26. $\frac{1}{8} = 4^{7x-4}$ [A] $\frac{5}{14}$ [B] $\frac{1}{14}$ [C] $\frac{1}{7}$ [D] $\frac{11}{14}$

27. $\left(\frac{1}{4}\right)^x = 64$ [A] $-\frac{1}{3}$ [B] $\frac{1}{3}$ [C] –3 [D] 3

28. Solve for *x*: $\ln(3x+6) = 2$ [A] 0.463 [B] 9.3891 [C] 5.3891 [D] 4.463

29. The formula $A = 2000e^{rt}$ can be used to find the dollar value of an investment of \$2000 after t years when the interest is compounded continuously at a rate of r percent.
a. Find the value of the investment after 5 years if the interest rate is 7%.
b. Find the value of the investment after 6 years if the interest rate is 5%.

[A] a. \$3021.26 b. \$2699.72 [B] a. \$2838.14 b. \$2699.72 [C] a. \$3021.26 b. \$2961.59 [D] a. \$2838.14 b. \$2961.59

30. If a principal of \$630 is invested at an annual interest rate of 5% compounded annually, which is the account balance at the end of 7 years?

[A] \$851 [B] \$844 [C] \$886 [D] \$631

31. If \$1550 is invested in an account which earns 7% interest compounded annually, what will be the balance of the account at the end of 11 years? Use the formula $A = P(1+r)^t$, where A is the account balance, P is the amount originally invested, r is the interest rate as a decimal, and t is the time invested in years.

[A] \$2744 [B] \$1552 [C] \$3263 [D] \$531,214

32. Find the vertex, focus, and directrix of the parabola.

$x = \frac{1}{20}(y+3)^2 - 7$

[A] Vertex: $(-7, -3)$, Focus: $(12, 3)$, Directrix: $x = 12$

[B] Vertex: $(7, -3)$, Focus: $(-2, 3)$, Directrix: $x = -12$

[C] Vertex: $(7, -3)$, Focus: $(12, -3)$, Directrix: $x = 2$

[D] Vertex: $(-7, -3)$, Focus: $(-2, -3)$, Directrix: $x = -12$

33. Solve by substitution. $-8x + 10y = 3$
$-x - 7y = 3$

[A] $\left(-\frac{7}{22}, -\frac{17}{22}\right)$ [B] $\left(-\frac{17}{22}, -\frac{7}{22}\right)$ [C] dependent [D] inconsistent

34. Use elimination to solve each system of equations. $2x - 3y = -5$
$x + 4y = 4$

[A] $(-2, -3)$ [B] $\left(-\frac{8}{11}, \frac{13}{11}\right)$ [C] infinitely many [D] no solution

35. Solve:

$$\begin{cases} x+y-z=14 \\ 5x-3y-z=50 \\ 4x+2y+4z=2 \end{cases}$$

[A] $(11,\ 2,\ 7)$ [B] $(8,\ -1,\ -7)$ [C] $(2a+6,\ 3a+7,\ a)$ [D] $(11,\ -1,\ -2)$

36. Solve the system of equations using substitution.

$$\begin{aligned} x^2-4y^2&=-96 \\ x-4y&=-18 \end{aligned}$$

[A] $(2,\ 5),\ (10,\ 7)$ [B] $(2,\ 5),\ (-46,\ 5)$

[C] $(2,\ 7),\ (-46,\ 5)$ [D] $(2,\ 7),\ (10,\ 5)$

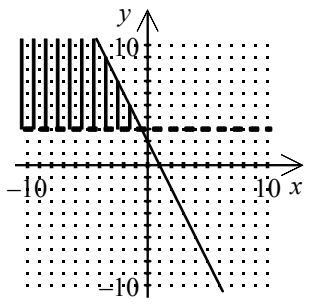
37. Find all real solutions to the system of equations using the addition method. $\begin{aligned} x^2+y^2&=144 \\ x^2-4y^2&=64 \end{aligned}$

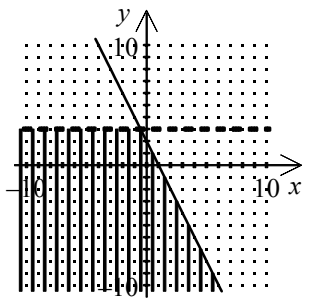
[A] $(8\sqrt{2},\ 4),\ (8\sqrt{2},\ -4),\ (-9,\ 4),\ (-9,\ -4)$

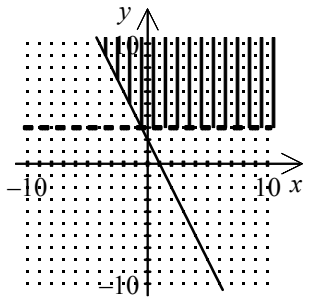
[B] $(8\sqrt{2},\ 4),\ (8\sqrt{2},\ -4),\ (-8\sqrt{2},\ 4),\ (-8\sqrt{2},\ -4)$

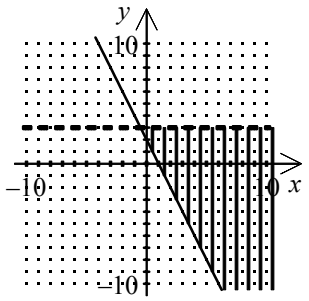
[C] $(2\sqrt{3},\ 4),\ (2\sqrt{3},\ -4),\ (-9,\ 4),\ (-9,\ -4)$ [D] no real solution

38. Graph the solution set. $y \le -2x + 2$
$y < 3$

[A] 

[B] 

[C] 

[D] 

39. Solve the system of linear equations using Gaussian elimination.

$$\begin{cases} 13x - 5y = 4 \\ -2x + 7y = 0 \end{cases}$$

[A] $\left(\frac{1}{80}, -\frac{1}{728}\right)$ [B] $\left(\frac{28}{81}, \frac{8}{81}\right)$ [C] $\left(-\frac{1}{728}, \frac{1}{80}\right)$ [D] $\left(\frac{8}{81}, \frac{28}{81}\right)$

40. Evaluate the expression.

$A + B$

$$A = \begin{bmatrix} -8 & -4 & 0 \\ -1 & -3 & 1 \\ -7 & -2 & -5 \end{bmatrix}, \quad B = \begin{bmatrix} -1 & -5 & 0 \\ -7 & -9 & 1 \\ -4 & -3 & -8 \end{bmatrix}$$

[A] $\begin{bmatrix} -9 & -9 & 0 \\ -8 & -12 & 2 \\ -11 & -5 & -13 \end{bmatrix}$

[B] $\begin{bmatrix} -9 & -9 & 0 \\ -8 & -12 & -13 \\ -11 & -5 & 2 \end{bmatrix}$

[C] $\begin{bmatrix} -7 & 1 & 0 \\ 6 & 6 & 3 \\ -3 & 1 & 0 \end{bmatrix}$

[D] $\begin{bmatrix} -7 & 1 & 0 \\ 6 & 6 & 0 \\ -3 & 1 & 3 \end{bmatrix}$

41. Find the product, if possible.

BA, if $A = \begin{bmatrix} -2 & -3 & -2 \\ 1 & -5 & 3 \\ 4 & -4 & -1 \end{bmatrix}$, $B = \begin{bmatrix} -5 & 5 & -2 \\ -3 & -4 & 1 \\ -1 & -2 & -5 \end{bmatrix}$

[A] $\begin{bmatrix} 10 & -15 & 4 \\ -3 & 20 & 3 \\ -4 & 8 & 5 \end{bmatrix}$

[B] $\begin{bmatrix} 10 & 5 & -8 \\ 9 & 20 & -4 \\ 2 & -6 & 5 \end{bmatrix}$

[C] $\begin{bmatrix} 21 & 6 & 11 \\ 7 & 19 & -22 \\ -7 & 38 & -7 \end{bmatrix}$

[D] $\begin{bmatrix} 7 & -2 & 27 \\ 6 & 25 & -7 \\ -20 & 33 & 1 \end{bmatrix}$

42. Find the inverse of the matrix A, if it exists.

$A = \begin{bmatrix} -2 & 1 & -5 \\ 0 & 4 & 3 \\ 0 & 0 & 2 \end{bmatrix}$

[A] $\begin{bmatrix} 0 & -\frac{1}{2} & \frac{1}{8} \\ 0 & 0 & -\frac{23}{16} \\ \frac{1}{4} & 0 & 0 \end{bmatrix}$

[B] $\begin{bmatrix} -\frac{1}{2} & 0 & 0 \\ \frac{1}{8} & \frac{1}{4} & 0 \\ -\frac{23}{16} & -\frac{3}{8} & \frac{1}{2} \end{bmatrix}$

[C] $\begin{bmatrix} -\frac{1}{2} & \frac{1}{8} & -\frac{23}{16} \\ 0 & \frac{1}{4} & -\frac{3}{8} \\ 0 & 0 & \frac{1}{2} \end{bmatrix}$

[D] Does not exist

43. If possible, solve the system of equations using an inverse matrix.

$\begin{cases} -2x + 4y = 0 \\ 5x - 8y = -7 \end{cases}$

[A] $\left(7, \frac{7}{2}\right)$ [B] $\left(-7, -\frac{7}{2}\right)$ [C] $\left(-\frac{7}{2}, -7\right)$ [D] No solution

44. Find the determinant of the matrix. [A] 5 [B] –17 [C] –5 [D] 17

$\begin{bmatrix} -3 & -5 \\ -4 & -1 \end{bmatrix}$

45. Use Cramer's Rule to solve (if possible) the system of equations.

$\begin{cases} 2x + 5y = 10 \\ 3x - 3y = 7 \end{cases}$

[A] $\left(\frac{16}{21}, \frac{65}{21}\right)$ [B] $\left(-\frac{44}{21}, -\frac{5}{21}\right)$ [C] $\left(-\frac{5}{21}, -\frac{44}{21}\right)$ [D] $\left(\frac{65}{21}, \frac{16}{21}\right)$

46. Find the minor M_{32} of the matrix A. [A] 26 [B] –55 [C] 55 [D] –26

$$A = \begin{bmatrix} 4 & -2 & -9 \\ 3 & -8 & 7 \\ 5 & -6 & 1 \end{bmatrix}$$

47. Solve by factoring. [A] 18, –4 [B] 36, –2 [C] 1, –72 [D] 8, –9

$x^2 + x - 72 = 0$

48. Solve by taking the square root. $3x^2 = 12$

[A] ± 2 [B] $\pm\sqrt{36}$ [C] ± 6 [D] $\pm\sqrt{9}$

49. Solve using the quadratic formula. $5x^2 - 2x - 5 = 0$

[A] $\dfrac{-1+2\sqrt{26}}{5}, \dfrac{-1-2\sqrt{26}}{5}$ [B] $\dfrac{1+2\sqrt{26}}{5}, \dfrac{1-2\sqrt{26}}{5}$

[C] $\dfrac{-1+\sqrt{26}}{5}, \dfrac{-1-\sqrt{26}}{5}$ [D] $\dfrac{1+\sqrt{26}}{5}, \dfrac{1-\sqrt{26}}{5}$

50. Find the vertex of the graph of the function.

$f(x) = (x+2)^2 + 1$

[A] $(-2,\ -1)$ [B] $(-2,\ 1)$ [C] $(2,\ -1)$ [D] $(2,\ 1)$

Reference: [1.1.1.2]

[1] [C]

Reference: [1.4.1.49]

[2] [B]

Reference: [1.4.3.57]

[3] [A]

Reference: [1.4.2.53]

[4] [D]

Reference: [1.4.4.62]

[5] [B]

Reference: [1.5.1.65]

[6] [D]

Reference: [1.5.3.73]

[7] [A]

Reference: [1.5.4.77]

[8] [C]

Reference: [2.1.5.17]

[9] [D]

Reference: [2.2.3.32]

[10] [D]

Reference: [2.3.2.53]

[11] [C]

Reference: [2.4.2.70]

[12] [B]

Reference: [2.5.3.85]

[13] [B]

Reference: [2.6.1.97]

[14] [C]

Reference: [2.6.3.106]

[15] [D]

Reference: [3.2.2.21]

[16] [B]

Reference: [3.2.3.25]

[17] [D]

Reference: [3.3.5.54]

[18] [B]

Reference: [3.4.1.62]

[19] [A]

Reference: [3.5.1.80]

[20] [D]

Reference: [3.5.4.92]

[21] [C]

Reference: [3.5.5.93]

[22] [D]

Reference: [4.1.4.14]

[23] [A]

Reference: [4.2.2.25]

[24] [C]

Reference: [4.3.1.40]

[25] [D]

Reference: [4.5.1.69]

[26] [A]

Reference: [4.5.1.70]

[27] [C]

Reference: [4.5.2.75]

[28] [A]

Reference: [4.6.1.81]

[29] [B]

Reference: [4.6.1.82]

[30] [C]

Reference: [4.6.1.84b]

[31] [C]

Reference: [5.1.2.5]

[32] [D]

Reference: [6.1.1.3]

[33] [B]

Reference: [6.1.2.5]

[34] [B]

Reference: [6.2.1.13]

[35] [B]

Reference: [6.3.1.33]

[36] [A]

Reference: [6.3.1.34]

[37] [B]

Reference: [6.5.2.47]

[38] [B]

Reference: [7.1.3.9]

[39] [B]

Reference: [7.2.1.17]

[40] [A]

Reference: [7.2.3.25]

[41] [D]

Reference: [7.3.1.35]

[42] [C]

Reference: [7.3.2.37]

[43] [B]

Reference: [7.4.1.45]

[44] [B]

Reference: [7.5.1.65]

[45] [D]

Reference: [7.4.2.49]

[46] [C]

Reference: [1.3.1.27]

[47] [D]

Reference: [1.3.2.30]

[48] [A]

Reference: [1.3.4.38]

[49] [D]

Reference: [2.4.1.65]

[50] [B]