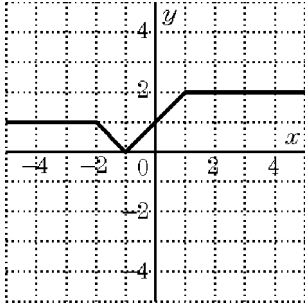


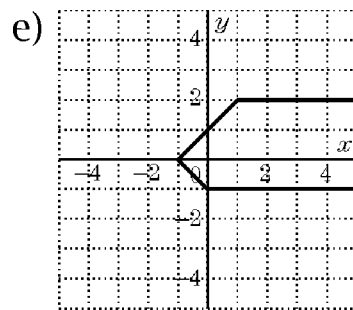
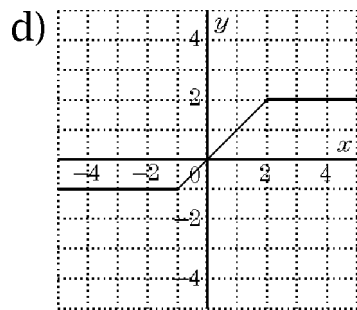
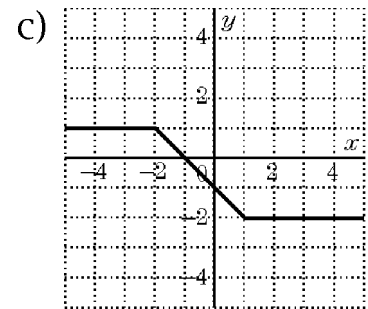
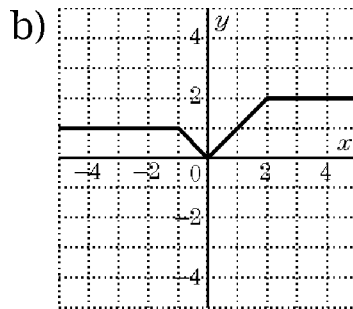
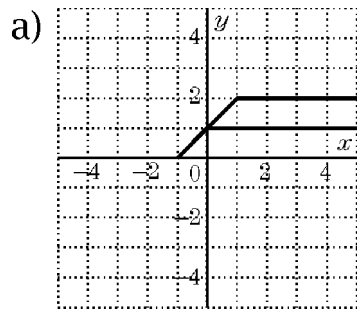
- If $g(x) = 2x^3 - 3x + 5$, find $g(-3)$.
a) -40 b) -22 c) 32 d) 40 e) 50
- If $f(x) = 3x - 1$ and $g(x) = 4x + 3$, then $g[f(x)] =$
a) $12x^2 + 5x - 3$ b) $12x^2 + 13x - 3$ c) $7x + 2$
d) $12x - 1$ e) $12x + 8$
- Let $f(x) = 5x - 1$ and $g(x) = x^2 + 4$. Find $(f \times g)(x)$.
a) $5x^3 - 4$ b) $5x^2 - 4$ c) $x^2 + 5x - 3$
d) $x^2 + 5x + 3$ e) $5x^3 - x^2 + 20x - 4$
- Find the asymptotes of $y = \frac{3x - 7}{x^2 + 5x}$.
a) $y = 0$ only b) $x = 0$ and $x = -5$
c) $x = 0$ and $y = 0$ d) $x = 0$, $x = -5$, and $y = x$
e) $x = 0$, $x = -5$, and $y = 0$
- For what value(s) of x does the function defined by $f(x) = \frac{x^2 + 4x - 21}{x^2 + 10x + 21}$ have a removable discontinuity?
a) -7 only b) -3 only c) 7 only
d) -7 and -3 e) 7 and 3

6. Given the function $y = 2x + 5$, describe the change when $y = -2x + 5$.
- a) Graph is reflected in the y -axis.
 - b) Graph is reflected in the x -axis.
 - c) Graph is reflected in the line $y = x$.
 - d) Graph is reflected in the line $y = -x$.
 - e) Graph is reflected in both axes.
7. Which equation could represent the graph of $y = f(x)$ when it is expanded horizontally by a factor of 3, then translated 2 units right?
- a) $y = f\left(\frac{1}{3}(x + 2)\right)$
 - b) $y = f(3(x - 2))$
 - c) $y = f\left(\frac{1}{3}(x - 2)\right)$
 - d) $y = f(3(x + 2))$
 - e) $y = 3f(x - 2)$
8. How is the graph of $y = \frac{3}{x + 2}$ related to the graph of $y = \frac{1}{x}$?
- I. vertical expansion by a factor of 3
 - II. vertical compression by a factor of $\frac{1}{3}$
 - III. translation of 2 units right
 - IV. translation of 2 units left
- a) I and III
 - b) I and IV
 - c) II and III
 - d) II and IV
 - e) none of these

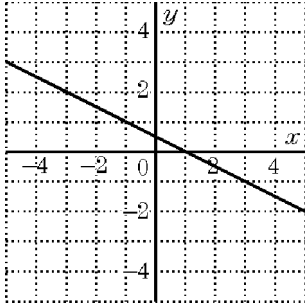
9.



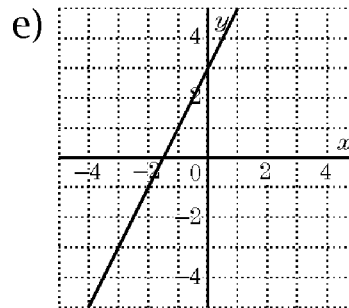
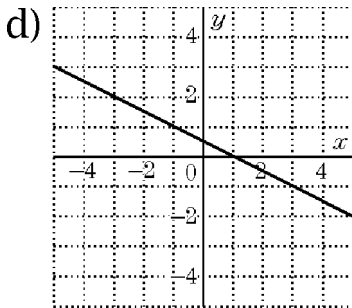
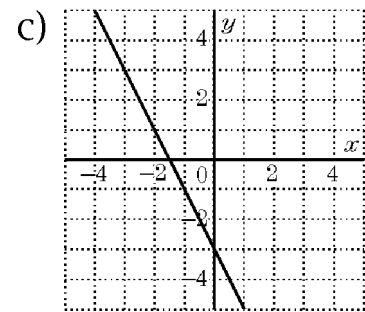
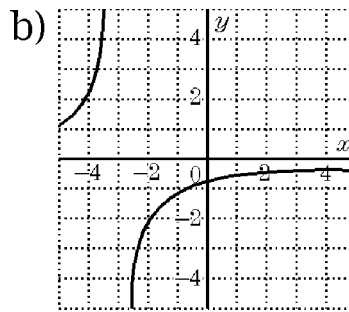
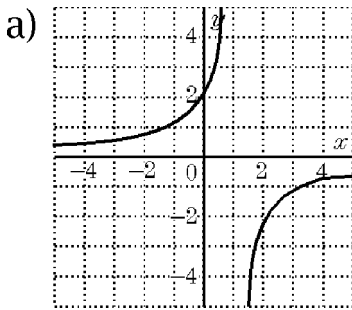
The graph of $|f(x)|$ is shown. Which is the graph of $f(x)$?



10.



The graph of $y = f(x)$ is shown. Which is the graph of $y = \frac{1}{f(x)}$?



11. What is the equation of the graph shown?

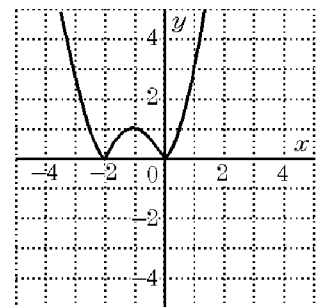
a) $y = \frac{1}{(x+2)^2}$

b) $y = |(x+2)^2 - 2(x+1)|$

c) $y = |(x+2)^2|$

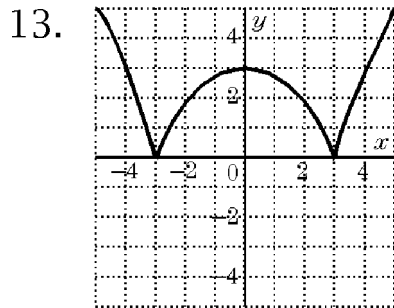
d) $y = |x^2 + 2x|$

e) $y = (x+2)^2 - 2(x+1)$

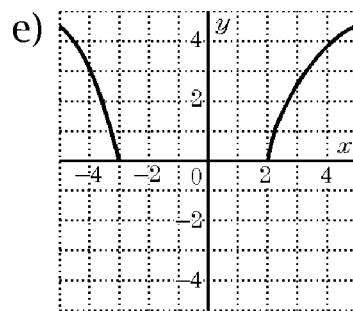
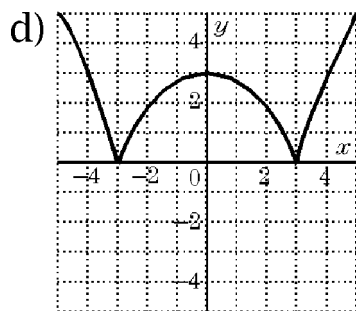
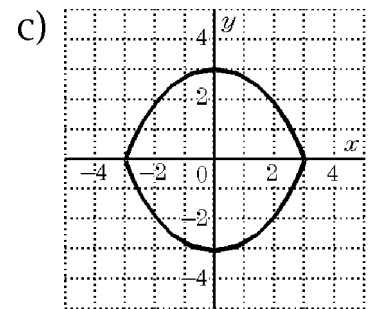
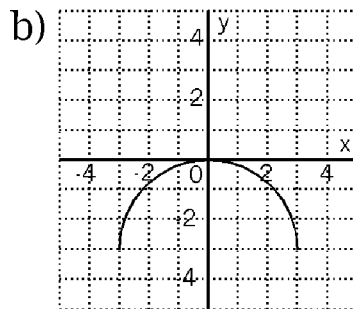
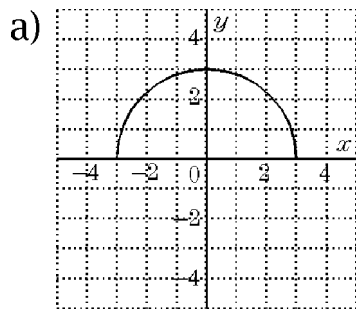


12. Given $y = 2x^2 - 50$, what is (are) the asymptote(s) of the reciprocal function?

- a) $x = 10$ b) $x = 25$ c) $y = 25$ d) $x = \pm 5$ e) $x = 2$



If the graph of $y = \sqrt{|9 - x^2|}$ is shown, then the graph of $y = \sqrt{9 - x^2}$ looks like:



14. When a polynomial $P(x)$ is divided by $2x + 1$ the quotient is $x^2 - x + 4$ and the remainder is 3. What is $P(x)$?
- a) $P(x) = 2x^3 - x^2 - 7x + 7$ b) $P(x) = 2x^3 + x^2 + 7x + 7$
c) $P(x) = 2x^3 - x^2 + 7x + 7$ d) $P(x) = 2x^3 + x^2 - 7x - 7$
e) $P(x) = 2x^3 - x^2 + 7x - 7$
15. Write the division statement for $(x^5 - 3x^3 + 2x - 8) \div (x - 4)$.
- a) $(x^4 + 4x^3 + 13x^2 + 52x + 210)(x - 4) + 832$
b) $(x^4 + 4x^3 + 13x^2 + 54)(x - 4) + 208$
c) $(x^4 + x^2 + 6)(x + 4) - 16$
d) $(x^4 + x^2 + 6)(x - 4) + 32$
e) $(x^4 + x^2 + 6)(x - 4) + 16$
16. Determine the remainder when $P(x) = 3x^{21} + 4x^7 - 2$ is divided by $x + 1$.
- a) -9 b) -2 c) -1 d) 4 e) 5
17. According to the Rational Root Theorem, which of the following is *not* a possible root of $6x^3 - 3x^2 + 2x - 4 = 0$?
- a) $\frac{1}{3}$ b) $\frac{1}{2}$ c) $\frac{2}{3}$ d) $\frac{3}{4}$ e) $\frac{4}{3}$
18. If $(x + 2)$ is a factor of $x^3 + 2x^2 + kx + 6$, find k .
- a) -11 b) -3 c) 1 d) 3 e) 11

19. Which of the following polynomial function written in factored form best represents the graph and table given in the figure?

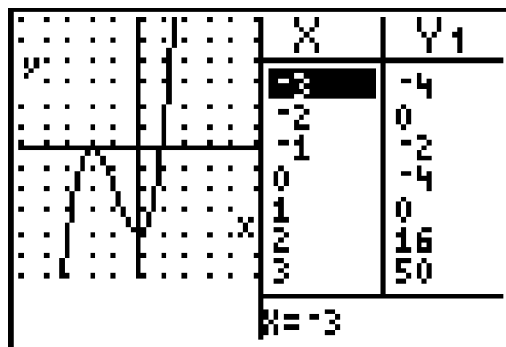
a) $P(x) = (x + 3)^2(x - 1)(x - 3)$

b) $P(x) = (x + 3)^2(x - 1)$

c) $P(x) = (x - 3)(x + 1)(x + 2)$

d) $P(x) = (x - 3)(x - 1)(x + 2)$

e) $P(x) = (x + 2)^2(x - 1)$



20. Find a polynomial equation that has integral coefficients and 0 as a triple root and -2 as a double root.

a) $x^5 + 4x^4 + 4x^3 + 4 = 0$

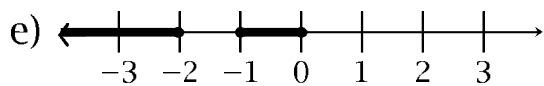
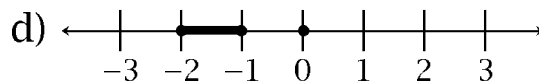
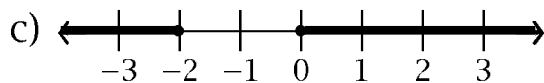
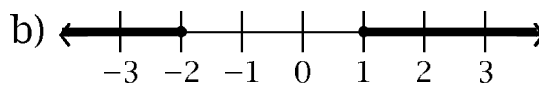
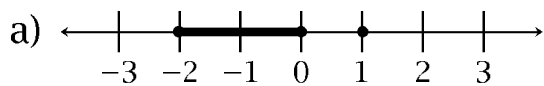
b) $x^5 - 4x^4 + 4x^3 = 0$

c) $x^5 + 4x^4 - 4x^3 = 0$

d) $x^5 - 4x^4 - 4x^3 = 0$

e) $x^5 + 4x^4 + 4x^3 = 0$

21. Determine the graph of the solution of the inequality $x(x - 1)^n(x + 2)^m \leq 0$, if n is an even positive integer and m is an odd positive integer.



22. Write $3^y = 73$ in logarithmic form.

- a) $73 = \log_3 y$ b) $73 = \log_y 3$ c) $3 = \log_y 73$
d) $3 = \log_{73} y$ e) $y = \log_3 73$

23. Find the value of x if $\log_x 18 = 2$.

- a) $2\sqrt{3}$ b) $3\sqrt{2}$ c) 9 d) $18\sqrt{2}$ e) 324

24. Which of the following is the inverse relation of $y = \log 3x$?

- a) $y = 3^x$ b) $y = 3x$ c) $y = \frac{1}{\log 3x}$
d) $y = \frac{10^x}{3}$ e) $y = \log_{3x} 10$

25. Give the domain of the relation $\log_x(y - 2) = \log_x(3 - x)$.

- a) $x > 0, x \neq 1$ b) $x > 3$ c) $0 < x < 3, x \neq 1$
d) $0 < x < 3$ e) $-3 < x < 3$

26. Write as a single logarithm: $3 \log 2 - \frac{1}{2} \log 16$

- a) $\log 1$ b) $\log 2$ c) $\log \frac{3}{4}$ d) $\log \frac{9}{4}$ e) $\frac{3}{2} \log 32$

27. Simplify: $\log_a(bc) - \log_a\left(\frac{c}{b}\right)$

- a) $(\log_a b)^2$ b) $2 \log_a b$ c) $\log_a 2b$ d) $a \log b^2$ e) 0

28. Which of the following is a simplified value of $\frac{\log x^2 + \log x^5}{\log x^5 - \log x^3}$?

- a) $\frac{7}{2}$ b) $\frac{10}{2}$ c) $\frac{\log 7}{\log 2}$ d) $\frac{\log 10}{\log 2}$ e) $\frac{\log 7x}{\log 2x}$

29. Which of the following is equal to $\log x$ if $x = \frac{ab}{\sqrt[4]{c}}$?

- a) $\log a + \log b - \log 4c$ b) $\log a + \log b - 4 \log c$
 c) $\log a + \log b - \frac{1}{4} \log c$ d) $\frac{\log a + \frac{1}{4} \log b}{\log c}$
 e) $\frac{\log a + 4 \log b}{\log c}$

30. Find the exact value of t given $7^{2t} = 3^5$.

- a) $5 \log 3 - 2 \log 7$ b) $\frac{3^5}{49}$ c) $\frac{5 \log 3}{2 \log 7}$
 d) $3^5 - 49$ e) $3 \log 5 - 7 \log 2$

31. A particular bacteria population doubles every 9 days. Determine an expression for the number of bacteria N after t days, given an initial amount of 500 bacteria.

- a) $N = 500(9)^{t/9}$ b) $N = 500(2)^{t/9}$ c) $N = 500(9)^{t/2}$
 d) $N = 500(2)^{9t}$ e) $N = 500(9)^{2t}$

32. Determine the exact value, in radians, of 210° .

- a) $\frac{1\pi}{12}$ b) $\frac{7\pi}{12}$ c) $\frac{5\pi}{6}$ d) $\frac{7\pi}{6}$ e) $\frac{7\pi}{3}$

33. θ is an angle in standard position whose terminal arm is in quadrant IV and $\cos \theta = \frac{3}{\sqrt{13}}$. Find $\sin \theta$.

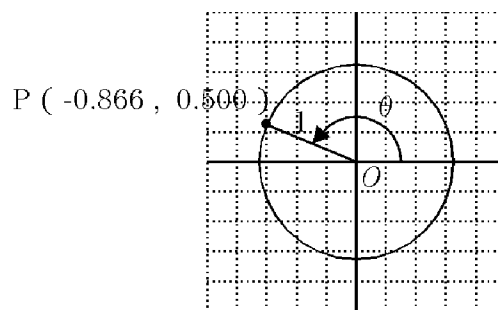
- a) $-\frac{2}{\sqrt{13}}$ b) $-\frac{4}{\sqrt{13}}$ c) $\frac{2}{\sqrt{13}}$ d) $\frac{4}{\sqrt{13}}$ e) $\frac{\sqrt{13}}{2}$

34. Solve: $\cos x = 0.29$, $0 \leq x \leq 2\pi$ (accurate to 2 decimal places)

- a) 0.29, 2.85 b) 0.96, 5.32 c) 1.28, 1.86 d) 1.28, 5.01 e) 0.29, 1.86

35. In the diagram, determine the approximate values of $\sin \theta$ and $\cos \theta$.

- a) $\sin \theta = 0.866$, $\cos \theta = 0.500$
 b) $\sin \theta = -0.866$, $\cos \theta = -0.500$
 c) $\sin \theta = -0.500$, $\cos \theta = -0.866$
 d) $\sin \theta = 0.500$, $\cos \theta = -0.866$
 e) $\sin \theta = -0.500$, $\cos \theta = -0.134$



36. Determine the exact value of $\cos\left(-\frac{5\pi}{3}\right)$.

- a) $\frac{\sqrt{3}}{2}$ b) $-\frac{\sqrt{3}}{2}$ c) $\frac{1}{2}$ d) $-\frac{1}{2}$ e) $\frac{\sqrt{2}}{2}$

37. What is the period of the function $y = 2 \sin \frac{2}{3}\theta$?

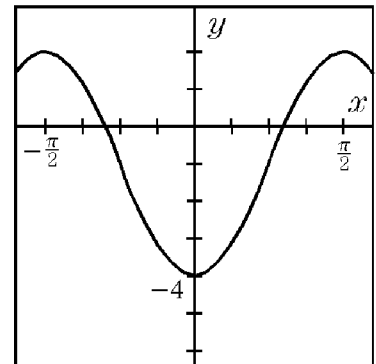
- a) $\frac{4\pi}{3}$ b) 2 c) $\frac{3}{2}$ d) 3π e) 4π

38. What is the phase shift of the function $f(x) = \sin(3x + 3)$?

- a) 1 unit left b) 3 units right c) 3 units down
 d) $\frac{2}{\pi}$ units right e) $\frac{2}{\pi}$ units left

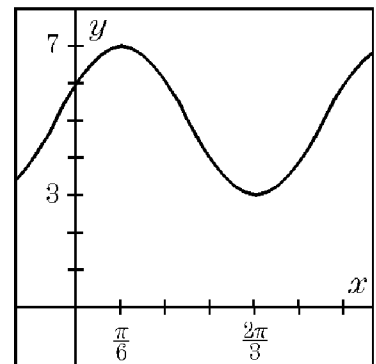
39. Given the graph of $y = a \sin b(x + c) + d$, determine the value of b .

- a) $\frac{1}{2}$ b) 2 c) π d) 2π e) 4π



40. From the graph shown, what is the equation in the form $y = a \cos b(x - c) + d$?

- a) $2 \cos\left(x - \frac{\pi}{6}\right) + 5$ b) $2 \cos 2\left(x - \frac{\pi}{6}\right) + 5$
 c) $\cos 2\left(x + \frac{\pi}{6}\right) + 5$ d) $2 \cos 2\left(x + \frac{\pi}{6}\right) + 5$
 e) $2 \cos\left(x + \frac{\pi}{6}\right) + 5$



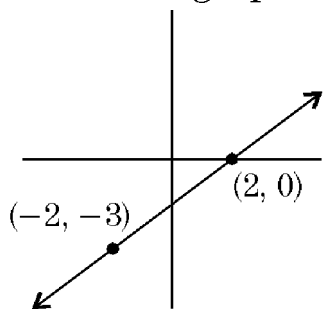
41. State the period of the function defined by $y = 2 \tan(\pi x)$.

- a) 1 b) 2 c) $\frac{\pi}{2}$ d) π e) 2π

42. Simplify $\cos x + \sin^2 x \sec x$.
- a) $\sin^2 x$ b) $\tan^2 x$ c) $\cos^2 x$ d) $\cos x$ e) $\sec x$
43. Use trigonometric identities to simplify $\sin\left(\frac{3\pi}{2} - x\right)$
- a) $-\sin x$ b) $-\cos x$ c) $\sin x$ d) $\cos x$ e) $\frac{1}{\cos x}$
44. Given that $\sin \alpha = -\frac{8}{17}$ and $\cos \beta = -\frac{4}{5}$, α and β are in quadrant III, then $\sin(\alpha - \beta) = \underline{\hspace{2cm}}$.
- a) $-\frac{28}{85}$ b) $-\frac{13}{85}$ c) $\frac{13}{85}$ d) $\frac{28}{85}$ e) $\frac{77}{85}$
45. Simplify: $\frac{1 + \cos 2\theta}{2}$
- a) $\csc^2 \theta$ b) $\tan^2 \theta$ c) $\cos^2 \theta$ d) $\sin^2 \theta$ e) $2 + \cos^2 \theta$
46. How many solutions are there in the interval $0 \leq x < 2\pi$ for the equation $3 \cos 2x = -3$?
- a) 1 b) 2 c) 3 d) 4 e) 0
47. A car licence plate consists of 7 characters. The first 4 characters are numerals from 0 to 9. The last 3 characters are letters excluding I, O, and X. How many different licence plates are possible?
- a) 109 b) 121 670 000 c) 139 827 687
d) 161 670 000 e) 175 760 000

48. A soccer team has a record of 12 wins, 6 losses, and 2 ties. In how many different orders could this record have occurred?)
- a) 6 b) 360 c) 332 640 d) 1 763 580 e) 3 527 160
49. From a deck of 52 cards, how many 5-card hands can be formed with at least 3 face cards?
- a) 1507 b) 20 592 c) 171 600 d) 192 192 e) 2 406 768
50. What is the middle term in the expansion of $(t - 4)^8$?
- a) $-17920t^5$ b) $-17920t^4$ c) $17920t^4$
d) $14336t^4$ e) $-14336t^4$

51. Given the graph of $f(x) =$

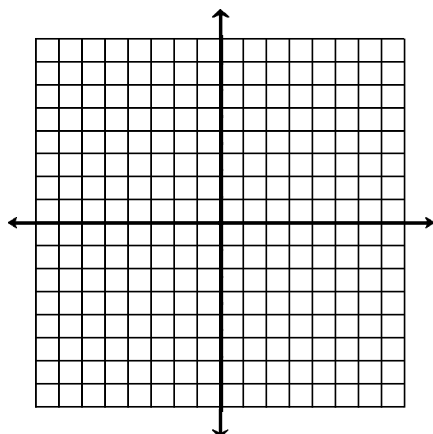


a) Graph

$$y = |f(x)|$$

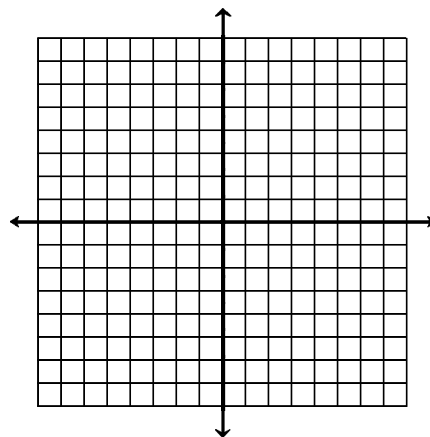
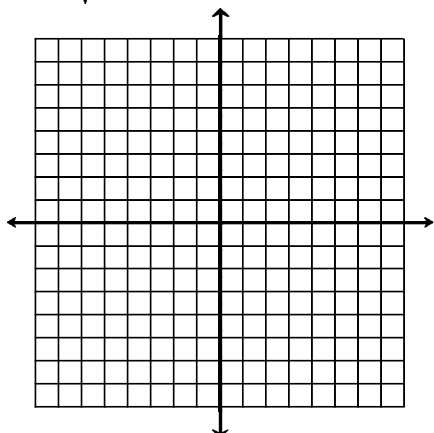
b) Graph

$$y = \frac{1}{f(x)}$$



c) Graph

$$y = \sqrt{f(x)}$$



52. For what values of x does the graph of the function $y = 4x^3 + 14x^2 - 2x - 3$ lie above the function $y = 2x^2 - x$?

53. Given the function $y = \log_3(x + 2) - 2$.

- a) Graph the function. Clearly show at least 2 points on the curve and state the equation of the asymptote.
- b) Calculate the zero of this function.

Solve.

54. Solve for θ if $-2\pi \leq \theta \leq 2\pi$
 $\tan \theta = 2 \sin \theta$

55. Starting at $(0,0)$ on a coordinate grid and moving along the grid lines either to the right or up, how many different ways are there to reach $(3,5)$?

56. At a seaport, the depth of the water, h metres, at time t hours, during a certain day high tide is 20 m and occurs at 8 am. Low tide is 8m and occurs at 2:12 pm.
- Write the equation of the depth of the water as a function of time.
 - At what time will the water be 10m high?

Verify each identity.

$$57. \sqrt{\frac{1 - \cos \theta}{1 + \cos \theta}} = \frac{1}{\csc \theta + \cot \theta}$$

Answer List

- | | | |
|--|----------------|----------------|
| 1. a | 2. d | 3. e |
| 4. e | 5. a | 6. a |
| 7. c | 8. b | 9. c |
| 10. a | 11. d | 12. d |
| 13. a | 14. c | 15. a |
| 16. a | 17. d | 18. d |
| 19. e | 20. e | 21. a |
| 22. e | 23. b | 24. d |
| 25. c | 26. b | 27. b |
| 28. a | 29. c | 30. c |
| 31. b | 32. d | 33. a |
| 34. d | 35. d | 36. c |
| 37. d | 38. a | 39. b |
| 40. b | 41. a | 42. e |
| 43. b | 44. b | 45. c |
| 46. b | 47. b | 48. e |
| 49. d | 50. c | 51. |
| 52. $-3 < x < -\frac{1}{2}$ OR $x > \frac{1}{2}$ | 53. [graph]; 7 | 54. [graph]; 7 |
| 55. 56 | 56. | 57. |

Catalog List

- | | | |
|---------------|----------------|----------------|
| 1. CM1 EA 20 | 2. CM1 EA 44 | 3. APC BC 2 |
| 4. APC BF 14 | 5. APC CF 16 | 6. AW3 AC 42 |
| 7. AW3 AE 15 | 8. AW3 AE 28 | 9. AW3 AF 40 |
| 10. AW3 AF 7 | 11. AW3 AF 15 | 12. AW3 AF 24 |
| 13. AW3 AF 34 | 14. CM1 PA 8 | 15. CM1 PA 12 |
| 16. CM1 PA 42 | 17. CM1 PB 18 | 18. CM1 PC 26 |
| 19. CM1 PC 50 | 20. CM1 PD 63 | 21. CM1 PF 10 |
| 22. CM1 OA 18 | 23. CM1 OA 48 | 24. CM1 OB 8 |
| 25. CM1 OB 30 | 26. CM1 OC 64 | 27. CM1 OC 68 |
| 28. CM1 OC 70 | 29. CM1 OC 102 | 30. CM1 OD 2 |
| 31. CM1 OE 14 | 32. CM1 IA 18 | 33. CM1 IB 24 |
| 34. CM1 IC 4 | 35. AW3 CD 2 | 36. AW3 CE 21 |
| 37. CM1 IE 26 | 38. CM1 IE 32 | 39. CM1 IE 63 |
| 40. CM1 IF 29 | 41. CM1 ID 11 | 42. CM1 IH 7 |
| 43. CM1 II 18 | 44. CM1 II 48 | 45. CM1 IJ 20 |
| 46. CM1 IK 14 | 47. AW3 FA 32 | 48. AW3 FC 27 |
| 49. AW3 FD 46 | 50. AW3 FF 30 | 51. |
| 52. CM1 PF 15 | 53. CM1 OB 70 | 54. |
| 55. AW3 FE 19 | 56. | 57. TRI QC 135 |