Math 120 Final Exam Review

This is to help you prepare for the final exam. This is not all inclusive.
Items not on the review may appear on the final exam.
Updated Spring 2026

1. Solve the following equations

a. $6x = 6x - 1$

b. $\left(\frac{1}{15}\right)(3x - 5) = \frac{x-4}{9}$

c. $\left(\frac{x}{2}\right) + 6 = \frac{3x}{4}$

d. $\frac{1}{x} + \frac{2}{x-5} = 0$

e. $\frac{3}{x-1} + \frac{2}{x+3} = \frac{12}{x^2+2x-3}$

f. $\frac{4}{x+1} - \frac{3}{x+2} = 1$

2. Solve the following equations

a. $(x^2 - 6x)^2 - 2(x^2 - 6x) - 35 = 0$

b. $m^{\frac{2}{5}} + m^{\frac{1}{5}} = 2$

c. $2x^{\frac{2}{3}} + 5x^{\frac{1}{3}} - 3 = 0$

d. $25\left(\frac{y+5}{5}\right)^2 + 20\left(\frac{y+5}{5}\right) + 4 = 0$

e. $w^4 + 2w^2 = 63$

f. $x^{\frac{1}{2}} - 5x^{\frac{1}{4}} - 24 = 0$

3. Simplify each expression. State "Not a real number" if applicable.

a. $36^{\frac{1}{2}}$

b. $-36^{\frac{1}{2}}$

c. $(-36)^{\frac{1}{2}}$

d. $36^{-\frac{1}{2}}$

e. $-36^{-\frac{1}{2}}$

f. $64^{\frac{1}{3}}$

g. $-64^{\frac{1}{3}}$

h. $(-64)^{\frac{1}{3}}$

i. $64^{-\frac{1}{3}}$

j. $64^{\frac{2}{3}}$

k. $81^{-\frac{3}{2}}$

l. $\frac{1}{81^{-\frac{1}{2}}}$

4. Write the expression using radical notation. Assume that all variables represent positive real numbers.

a. $c^{\frac{2}{3}}$

b. $6x^{\frac{2}{5}}$

c. $5b^{-\frac{2}{7}}$

5. Write the expression using rational exponents. Assume that the variable represents a positive real number.

a. $\sqrt[7]{z^4}$

b. $\sqrt[3]{5x^6}$

6. Simplify the expression. Assume that all variables represent positive real numbers. Write the final answer using positive exponents only.

a. $\frac{p^{\frac{9}{5}}}{p^{\frac{4}{5}}}$ b. $\left(w^{\frac{1}{2}}w^{\frac{1}{5}}\right)^{10}$ c. $\left(\frac{y^{-\frac{3}{2}}}{z^{-\frac{2}{3}}}\right)^{6}$ d. $\left(x^3y^{-\frac{1}{2}}\right)^4\left(x^{\frac{1}{2}}yz^{\frac{3}{5}}\right)^2$

7. Factor completely.

a. $6m^{\frac{7}{4}} + 9m^{\frac{3}{4}}$ b. $y^{\frac{5}{2}} - 5y^{\frac{3}{2}} - 36m^{\frac{1}{2}}$ c. $5x(2x+5)^{\frac{2}{3}} + (2x+5)^{\frac{5}{3}}$

d. $3x^{-5} - 9x^{-6} - 30x^{-7}$ e. $x(3x+2)^{-\frac{4}{5}} + (3x+2)^{\frac{1}{5}}$

8. Solve for the indicated variable

a. $\mathrm{B} = \mathrm{qsr}^2$ solve for r b. $\mathrm{A} = \pi\mathrm{r}^2$ solve for r c. $I - 2rt = Prt,$ for t

9. Solve the following equations by factoring

a. $10x^2 - 25x = 0$ b. $x^2 - 40 = -3x$ c. $2x^3 = 6x^2$

d. $x^3 + 13x^2 = 9(x + 13)$ e. $4x^2 + 12x + 9 = 0$ f. $x^3 + 2x^2 - x = 2$

10. Solve the following equations (complete the square, square root property, quadratic formula)

a. $x^2 - 2x - 3 = 0$ b. $2x^2 + 3x - 4 = 0$ c. $8x = 5 + 2x^2$

d. $x^2 + 6x + 10 = 0$ e. $9x^2 = 64$ f. $\left(y - \frac{8}{5}\right)^2 + \frac{7}{25} = 0$

g. $\frac{3}{x-2} - \frac{12}{x^2-4} = 1$

11. Solve the following equations

a. $\sqrt{3x+1} = 7$ b. $\sqrt{p-1} + 1 = p$

c. $\sqrt{4x-3} + 5 = x + 5$ d. $\sqrt{x} + \sqrt{x-24} = 2$

12. Write the domain of the function in interval form

a. $t(x) = \frac{x+2}{x^2-3x-28}$ b. $s(x) = \frac{x^2-3x-28}{x+2}$

c. $f(x) = \sqrt{x+7}$ d. $f(x) = \sqrt{x-3} + \sqrt{14-x} + 7$

13. Applications: a. The length of a rectangular road sign is 2 feet less than three times its width. Find the dimensions if the perimeter is 28 feet.

b. A 25 foot ladder is leaning against a wall. The distance from the top of the ladder to the floor is 5 feet more than the distance from the wall to the bottom of the ladder. Find the distance from the top of the ladder to the floor.

c. The sum of the square of a **positive** number and the square of 3 more than the number is 65. What is the number?

d. If the sum of three consecutive natural numbers is 69, write an equation and find the numbers.

e. How much of a 20% acid solution would a chemist have to mix with 1000 mL of a 40% acid solution to yield a 36% acid solution?

f. A rectangular picture frame has a length that is 2 inches more than its width. If the area of the frame is 48 square inches, what are the length and width of the frame?

g. The height of an object thrown off the top of a 384-ft cliff with a velocity of 8 feet per second is represented by the equation $h(t) = -16t^2 + 8t + 384$, where h is the height of the object above the ground in feet after t seconds. How long will it take the object to strike the ground?

h. Jayda can clean the house in 4 hours and her husband can clean it in 5 hours. How long will it take them to clean the house if they work together?

i. A cyclist can ride 12 mph in still air. Find the speed of the wind if she can ride 30 miles with the wind in the same time she can ride 20 miles against the wind.

14. Circles: $(x-h)^2+(y-k)^2=r^2$

a. Identify the center and the radius $\left(x-\frac{4}{7}\right)^2+\left(y+\frac{7}{6}\right)^2=\frac{16}{49}$

b. Write the equation in the center-radius form $x^2+y^2-10x\ +20y\ +25=0$

c. Find the equation of the circle with a diameter with endpoints $(0,4)$ and $(6,-2)$.

15. Given the function $f(x)=3x-3x^2$ determine

a. $f(2)$ b. $f(-1)$ c. $f(x+2)$ e. $f(x+h)$

16. Given the function $g(x)=\begin{cases}x^3-1 \text{ if } x\le -1\\ -x+4 \text{ if } x>-1\end{cases}$ determine

a. $g(-2)$ b. $g(0)$ c. $g(-1)$ e. $g(2)$

17. Find the zeroes of each function

a. $f(x)=6x^3-24x$ b. $g(x)=2x^2-14x+12$

c. $h(x)=2x^2+15x-8$ d. $m(x)=\sqrt[3]{3x-4}$

18. For each of the following

(i) Find and completely simplify the difference quotient $\frac{f(x+h)-f(x)}{h}$ for the functions.

(ii) Using the difference quotient, find the average rate of change from $x=-1\ to\ x=7$

(iii) Using the difference quotient, find the average rate of change from $x=-20\ to\ x=3$

a. $f(x)=x^2-5$ b. $f(x)=x^2-2x$

19. Starting with the appropriate parent function, sketch a graph of each transformation function

a. $f(x)=(x+2)^2-9$ b. $f(x)=(x-5)^3+4$ c. $f(x)=-x^2+3$

d. $f(x)=|x-4|+2$ e. $f(x)=\sqrt{x+5}-4$ f. $f(x)=-\sqrt{x-2}+1$

20. Find the function that results from applying the transformations to the parent function

a. parent $f\ (x) = |x|$ Shift left 2 units; Shift up 3 units; Reflect about the x−axis

b. parent $f\ (x) = |x|$ Reflect about the x−axis; Shift left 2 units; Shift up 3 units;

c. parent $f\ (x) = x^2$ Shift right 4 units; Shift down 3 units

d. parent $f\ (x) = x^3$ Shift right 7 units; Shift up 5 units

e. parent $f\ (x) = \sqrt{x}$ Shift left 5 units; Shift down 6 units

21. Using the functions $f(x) = 3 - x^2$ and $g(x) = -2x + 7$, evaluate the following

a. $(f + g)(-3)$ b. $(f - g)(x)$ c. $fg(x)$ d. $\frac{g}{f}(2)$

e. $(fog)(x)$ f. $(fog)(3)$ g. $(gof)(0)$ h. $(gog)(x)$

22. Using the functions $p(x) = x^2 + x - 2$, $r(x) = \frac{1}{x-4}$, and $q(x) = \sqrt{3x - 5}$, find the domain of the following (in interval notation).

a. $p(x)$ b. $r(x)$ c. $q(x)$ d. $\left(\frac{p}{q}\right)(x)$ e. $(r \circ q)(x)$

23. Determine the inverse function of

a. $f(x) = -5x - 3$ b. $g(x) = \sqrt{x} - 4$

24. Determine the vertex, axis of symmetry and any x and y intercepts; then graph. (may want to complete the square)

a. $f(x) = -(x + 2)^2 + 1$ b. $f(x) = \frac{1}{4}(x - 3)^2 - 1$ c. $g(x) = (x - 2)(x + 4)$

d. $f(x) = x^2 + 8x + 21$ e. $g(x) = -x^2 + 2x + 5$ f. $h(x) = 4x^2 - 4x + 21$

25. Find the equation of each parabola in standard form, given the vertex and a point on the parabola

a. Vertex $(1, -2)$; Point: $(-1,14)$ b. Vertex: $(-1,5)$; Point: $(0,9)$

26. Determine the degree of the polynomial; the end behavior; the zeros (with multiplicity of each); y-axis intercept; then graph

a. $f(x) = x(x-3)^2(x+2)^4$
b. $f(x) = 5x^3 - 10x^2 + 5x$
c. $f(x) = x^4 - 9x^2$
d. $f(x) = x^3 + 3x^2 - 4x - 12$
e. $f(x) = -3x^3 + 12x^2 - 9x$

27. Use the Remainder Theorem and synthetic division to find each function value

a. $g(x) = x^3 - 3x^2 + 5$ $g(4)$ $g(-7)$
b. $f(x) = 2x^3 - 7x + 3$ $f(1)$ $f(-2)$

28. Write the function as a product of linear factors; list all zeroes

a. $f(x) = x^3 + 8x^2 - 4x - 32$ Given $(x+8)$ is a factor
b. $f(x) = x^3 - 10x^2 + 17x - 8$
c. $f(x) = x^4 - 8x^3 + 9x^2 + 38x - 40$ Given $(x-5)$ and $(x+2)$ are factors
d. $f(x) = -5x^3 + 11x^2 - 4x - 2$
e. $f(x) = x^4 + 2x^2 - 8$
f. $f(x) = x^4 + 3x^3 + 11x^2 + 27x + 18$ Given one zero is $3i$

29. For which value(s) of the constant k does the function $f(x) = kx^3 - 6kx + 9$ have $(x-1)$ as a factor?

30. Compute the remainder when the polynomial function is divided by $(x+1)$

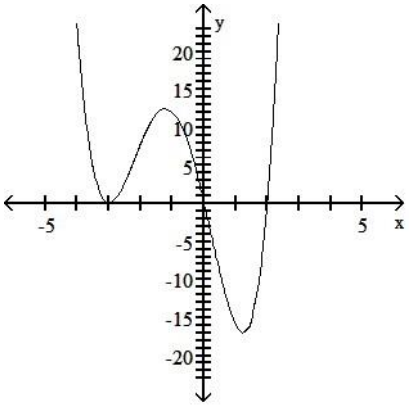
$$h(x) = x^{13} - 12x^{10} - 3x^7 - 5x^3 + x^2 - 3$$

31. Write a polynomial function of lowest degree possible based on the information given.

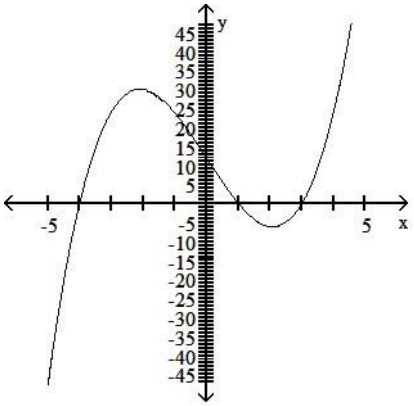
a. zeros: 3 (multiplicity 2); -4 (multiplicity 1)

b. zeros of -3 and $2-i$ (each multiplicity one) and $f(0)=5$

c. $g(x)$ based on the graph below



d. $h(x)$ based on the graph below



32. Graph each rational function, list all y-intercepts, x-intercepts, vertical asymptote(s), horizontal or slant asymptote, hole(s) as appropriate

a. $f(x)=\frac{x+1}{x^2-4}$ b. $f(x)=\frac{x}{x+3}$ c. $f(x)=\frac{2x^2-x}{x^2+3x-4}$ d. $f(x)=\frac{x^2-2x-3}{x-1}$

33. Solve the systems of equations by method of your choice.

a. $\begin{cases} 2x+y=9 \\ 3x-5y=20 \end{cases}$ b. $\begin{cases} 3x+2y=10 \\ 2x+5y=3 \end{cases}$ c. $\begin{cases} \frac{1}{2}x+\frac{3}{4}y=10 \\ \frac{3}{4}x-y=4 \end{cases}$

d. $\begin{cases} 8x+4y=-6 \\ -4x-2y=3 \end{cases}$ e. $\begin{cases} x-2y=7 \\ -2x+4y=1 \end{cases}$

34. For $A=\begin{bmatrix} 1 & -1 & 3 \\ 0 & 6 & 9 \end{bmatrix}$ and $B=\begin{bmatrix} -2 & 0 & -5 \\ -3 & 4 & -7 \end{bmatrix}$, if possible, find the following:

a. $A+B$ b. $A-B$ c. $3A-2B$

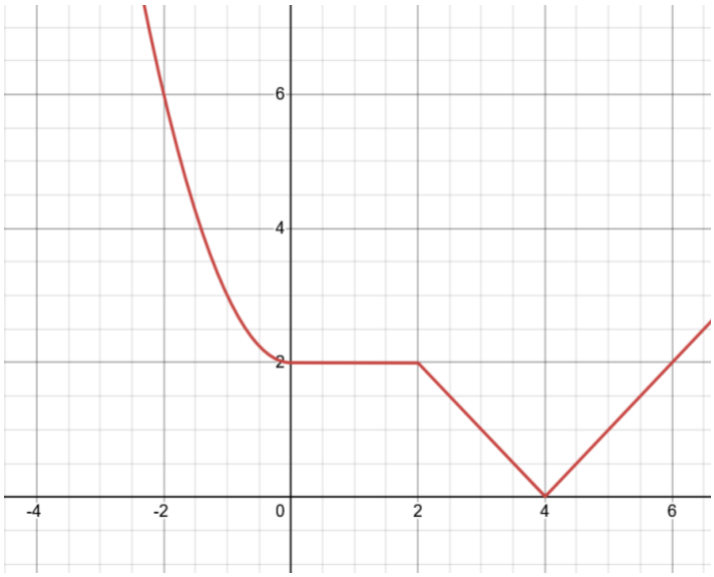
35. For $A=\begin{bmatrix} 1 & -1 & 3 \\ 0 & -2 & 9 \end{bmatrix}$ and $B=\begin{bmatrix} 3 & 1 \\ 2 & 4 \\ 7 & 0 \end{bmatrix}$, if possible, find the following:

a. $A+B$ b. $A-B$ c. $3A-2B$

36. Use Cramer's Rule to solve: $\begin{cases} 2x + y = 9 \\ 3x - 5y = 20 \end{cases}$

37. Use the graph of the function to the right to answer the following.

a) Determine $f(-2)$.



b) Determine $f(6)$.

c) Find all x for which $f(x) = 1$.

d) Find all x for which $f(x) = 3$.

e) Determine the x-intercept(s).

f) Determine the y-intercept.

g) Determine the domain of f.

h) Determine the range of f.

Multiple Choice View of Questions

M1. If $z(6z + 1) = 2$ Then

A. $z = 2\ or\ \frac{1}{6}$ B. $z = 2\ or\ \frac{-1}{6}$ C. $z = \frac{-1}{6}\ or\ \frac{1}{6}$ D. $z = \frac{-2}{3}\ or\ \frac{1}{2}$

M2. Two numbers that have a sum of -3 can be represented by

A. x and -3 $-$x B. x and -3 $+$x C. $-$x and $-3-$x D. x $+3$ and $-$x

M3. The solution(s) of the equation $(x-4)^{\frac{2}{3}} = 16$ is(are)

A. 68 B. -64 C. -8 and 8 D. -60 and 68

M4. The function f is defined by $f(x) = x^2 + bx + c$, where b is a constant. If the graph has x intercepts at $-5\ and\ 3$, which of the following correctly gives the value of b

A. $b = -5$ B. $b = -3$ C. $b = -2$ D. $b = 2$

M5. If $f(x) = 3x - 5\ \ and\ \ g(f(x)) = x$, then $g(x) =$

A. $\frac{x-5}{3}$ B. $\frac{x+5}{3}$ C. $\frac{2x+5}{3}$ D. $\frac{5-x}{3}$

M6. If $f(-6) = 21$ and f is one-to-one, then $f^{-1}(21) =$

A. $\frac{-1}{6}$ B. $\frac{1}{f(-6)}$ C. $\frac{1}{6}$ D. -6

M7. According to rational zeros theorem, which of the numbers listed below would **NOT** be a possible solution of the equation $14x^4 + 18x^3 - 401x^2 + 15x - 33 = 0$

A. $-\frac{11}{2}$ B. $\frac{1}{14}$ C. $-\frac{11}{7}$ D. 14

M8. If $-x^2 > -4 - 3x$, then the solution set is

A. $(-4,1)$ B. $(-4,-3)$ C. $(-1,4)$ D. $(-\infty,-1) \cup (4,\infty)$

Math 120 Final Exam Review ANSWER KEY

1. a. No solution b. $\left\{\frac{-5}{4}\right\}$ c. $\{24\}$ d. $\left\{\frac{5}{3}\right\}$ e. No solution f. $\{-3,1\}$

2. a. $\{-1,1,5,7\}$ b. $\{-32,1\}$ c. $\left\{-27,\frac{1}{8}\right\}$ d. $\{-7\}$ e. $\{-3i,3i,-\sqrt{7},\sqrt{7}\}$

f. $\{4096\}$

3. a. 6 b. -6 c. Not a real number d. $\frac{1}{6}$ e. $-\frac{1}{6}$ f. 4

g. -4 h. -4 i. $\frac{1}{4}$ j. 16 k. $\frac{1}{729}$ l. 9

4. a. $\sqrt[3]{c^2}$ b. $6\sqrt[5]{x^2}$ c. $\frac{5}{\sqrt[7]{b^2}}$

5. a. $z^{\frac{4}{7}}$ b. $5^{\frac{1}{3}}x^2$

6. a. p b. w^7 c. $\frac{z^5}{y^9}$ d. $x^{13}z^{\frac{6}{5}}$

7. a. $3m^{\frac{3}{4}}(2m+3)$ b. $y^{\frac{1}{2}}(y+4)(y-9)$ c. $(2x+5)^{\frac{2}{3}}(7x+5)$

d. $\frac{3(x-5)(x+2)}{x^7}$ e. $\frac{2(2x+1)}{(3x+2)^{\frac{4}{5}}}$

8. a. $r=\pm\sqrt{\frac{B}{qs}}$ b. $r=\pm\sqrt{A/\pi}$ c. $t=\frac{I}{Pr+2r}$

9. a. $\left\{0,\frac{5}{2}\right\}$ b. $\{-8,5\}$ c. $\{0,3\}$ d. $\{-13,-3,3\}$ e. $\left\{-\frac{3}{2}\right\}$ f. $\{-2,-1,1\}$

10. a. $\{-1,3\}$ b. $\left\{\frac{-3\pm\sqrt{41}}{4}\right\}$ c. $\left\{\frac{4\pm\sqrt{6}}{2}\right\}$ d. $\{-3\pm i\}$

e. $\left\{\pm\frac{8}{3}\right\}$ f. $\left\{\frac{8\pm i\sqrt{7}}{5}\right\}$ g. {1}

11. a. $\{16\}$ b. $\{1,2\}$ c. $\{1,3\}$ d. No solution (must solve original equation)

12. a. $(-\infty,-4) \cup (-4,7) \cup (7,\infty)$ b. $(-\infty,-2) \cup (-2,\infty)$ c. $[-7,\infty)$ d. $[3,14]$

13. a. $w = 4\ ft, l = 10\ ft$ b. 20 ft c. 4
d. $(n) + (n+1) + (n+2) = 69$; 22,23,24 e. 250mL of 20% f. $w = 6in, l = 8in$
g. $\frac{1+\sqrt{385}}{4}$ s h. 2 hrs $13.\overline{3}$ min i. 2.4 mph

14. a. center: $\left(\frac{4}{7}, \frac{-7}{6}\right)$ radius: $\frac{4}{7}$ b. $(x-5)^2 + (y+10)^2 = 100$; $r = 10$
c. $(x-3)^2 + (y-1)^2 = 18$; $r = 3\sqrt{2}$

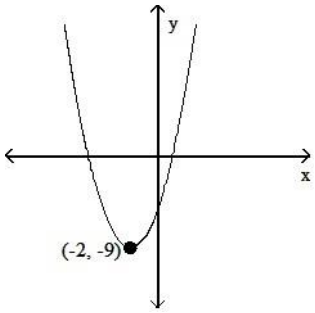
15. a. -6 b. -6 c. $-3x^2 - 9x - 6$ e. $-3x^2 - 6xh + 3x + 3h - 3h^2$

16. a. -9 b. 4 c. -2 e. 2

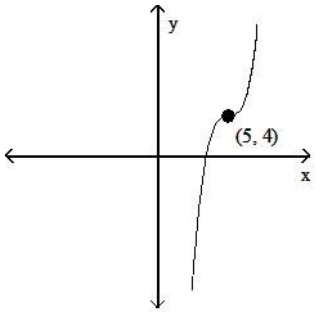
17. a. $-2, 0, 2$ b. $1, 6$ c. $-8, \frac{1}{2}$ d. $\frac{4}{3}$

18. a. $(i) DQ: 2x + h$; $(ii) m = 6$; $(iii) m = -17$
b. (i) $DQ: 2x + h - 2$; $(ii) m = 4$; $(iii) m = -19$

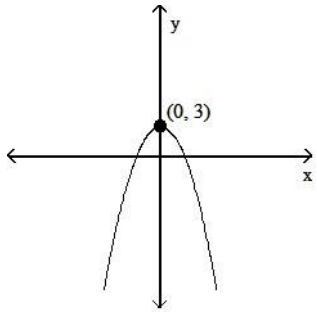
19. a. left 2; down 9 b. Right 5; up 4 c. Reflected about x-axis; up 3



a.

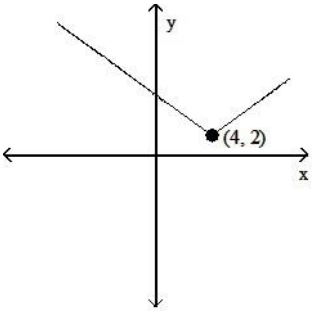


b.

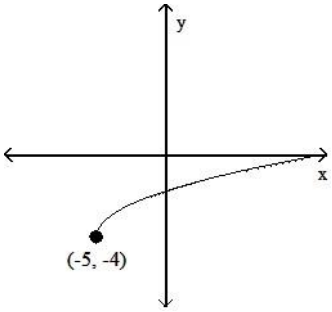


c.

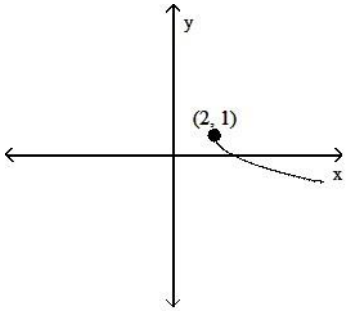
d. Right 4; up 2 e. Left 5; down 4 f. Reflected about x-axis; Right 2; up 1



d.



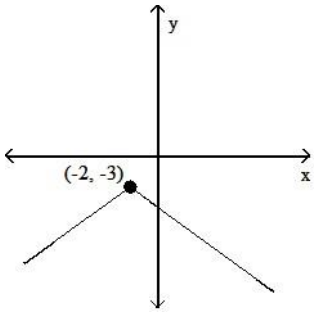
e.



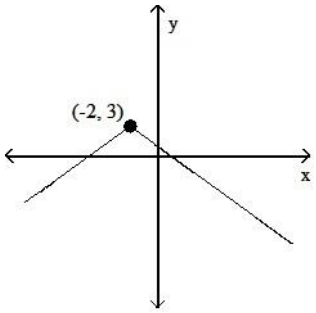
f.

20. a. $f\ (x) = -|x+2| - 3$ b. $f\ (x) = -|x+2| + 3$ c. $f\ (x) = (x+4)^2 - 3$

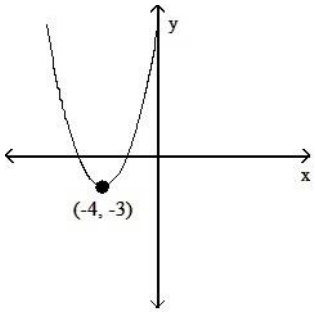
a.



b.

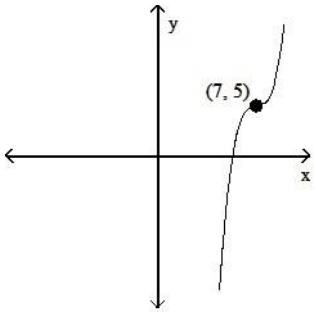


c.



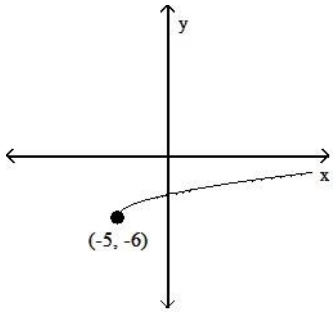
d. $f\ (x) = (x-7)^3 + 5$

d.



e. $f\ (x) = \sqrt{x+5} - 6$

e.



21. a. 7 b. $-x^2 + 2x - 4$ c. $2x^3 - 7x^2 - 6x + 21$ d. -3
e. $-4x^2 + 28x - 46$ f. 2 g. 1 h. $4x - 7$

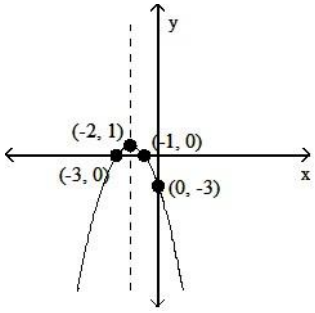
22. a. $(-\infty, \infty)$ b. $(-\infty, 4) \cup (4, \infty)$ c. $\left[\frac{5}{3}, \infty\right)$ d. $\left(\frac{5}{3}, \infty\right)$ e. $\left[\frac{5}{3}, 7\right) \cup (7, \infty)$

23. a. $f^{-1}(x) = -\frac{1}{5}x - \frac{3}{5}$ b. $g^{-1}(x) = (x+4)^2; x \geq -4$

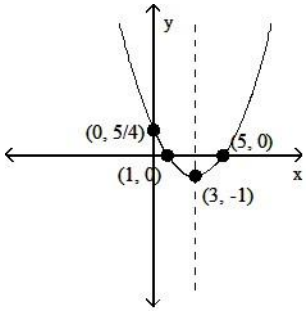
24. a. $V: (-2,1); x = -2; (-3,0),\ (-1,0);\ (0,-3)$
b. $V: (3,-1); x = 3; (1,0),\ (5,0);\ \left(0, \frac{5}{4}\right)$
c. $V: (-1,-9); x = -1; (-4,0),\ (2,0);\ (0,-8)$
d. $V: (-4,5); x = -4; no\ x-int;\ (0,21)$
e. $V: (1,6); x = 1; \left(1-\sqrt{6}, 0\right),\ \left(1+\sqrt{6}, 0\right);\ (0,5)$
f. $V: \left(\frac{1}{2}, 20\right); x = \frac{1}{2}; no\ x-int\ ;\ (0,21)$

24. Graphs

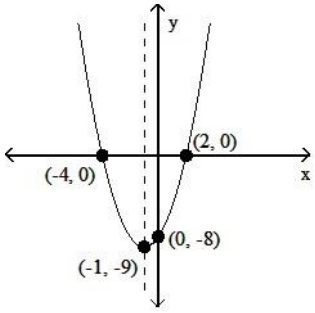
a.



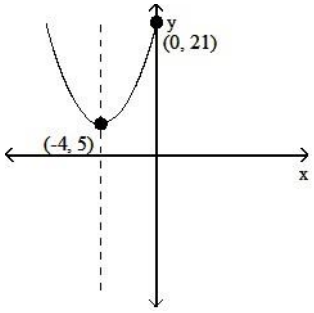
b.



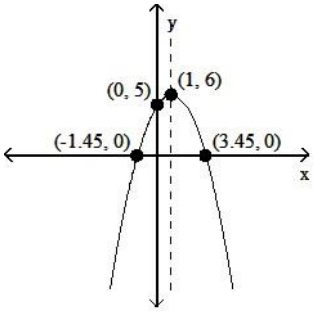
c.



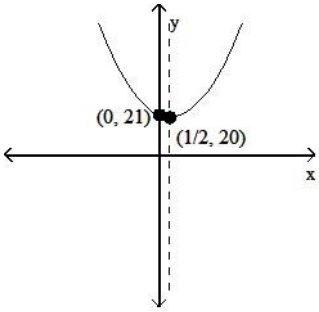
d.



e.



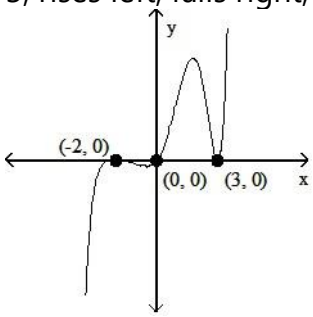
f.



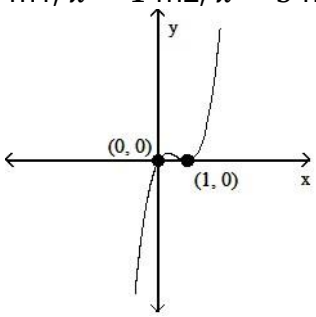
25. a. $f(x) = 4(x-1)^2 - 2$ b. $f(x) = 4(x+1)^2 + 5$

26. a. 7; falls left; rises right; $x = 0$ m1; $x = 3$ m2; $x = -2$ m 4; (0,0)
    b. 3; falls left; rises right; $x = 0$ m1; $x = 1$ m2; (0,0)
    c. 4; rises left; rises right; $x = 0$ m2; $x = -3$ m1; $x = 3$; m 1; (0,0)
    d. 3; falls left; rises right; $x = -3$ m1; $x = -2$ m1; $x = 2$ m 1; (0,-12)
    e. 3; rises left; falls right; $x = 0$ m1; $x = 1$ m2; $x = 3$ m 1; (0,0)

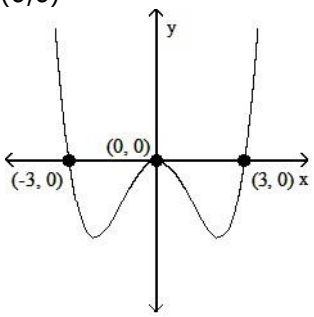
a.



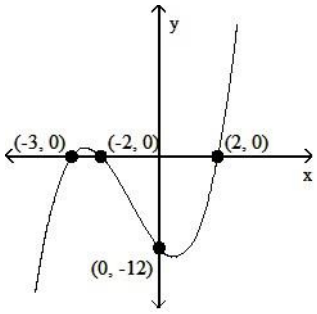
b.



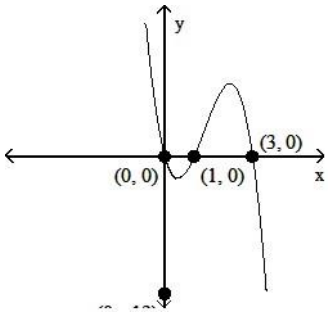
c.



d.



e.



27. a. $g(4) = 21$; $g(-7) = -485$ b. $f(1) = -2$; $f(-2) = 1$

28. a. $(x + 8)(x + 2)(x - 2)$ zeros: $-8, -2, 2$
    b. $f(x) = (x - 1)^2(x - 8)$ zeros: $8, 1$
    c. $f(x) = (x - 5)(x + 2)(x - 4)(x - 1)$ zeros: $-2, 1, 4, 5$
    d. $f(x) = (x - 1)\left(x - \left(\frac{3+\sqrt{19}}{5}\right)\right)\left(x - \left(\frac{3-\sqrt{19}}{5}\right)\right)$ zeros: $1, \frac{3\pm\sqrt{19}}{5}$
    e. $f(x) = (x + 2i)(x - 2i)\left(x + \sqrt{2}\right)\left(x - \sqrt{2}\right)$ zeros: $-2i, 2i, -\sqrt{2}, \sqrt{2}$
    f. $f(x) = (x + 2)(x + 1)(x - 3i)(x + 3i)$ zeros: $-2, -1, -3i, 3i$

29. $k = \frac{9}{5}$

30. -7

31. a. $f(x) = (x-3)^2(x+4) \rightarrow f(x) = x^3 - 2x^2 - 15x + 36$

b. $f(x) = \frac{1}{3}(x+3)\big(x-(2-i)\big)\big(x-(2+i)\big) \rightarrow f(x) = \frac{1}{3}x^3 - \frac{1}{3}x^2 - \frac{7}{3}x + 5$

c. $g(x) = x(x+3)^2(x-2) \rightarrow g(x) = x^4 + 4x^3 - 3x^2 - 18x$

d. $h(x) = (x+4)(x-1)(x-3) \rightarrow h(x) = x^3 - 13x + 12$

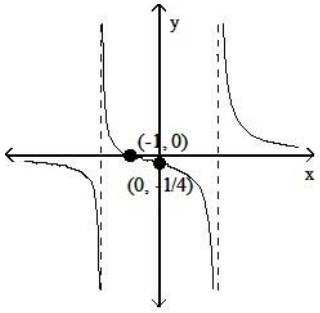
32. a. $VA: x = 2, x = -2;\ HA: y = 0;\ intercepts\ \left(0, -\frac{1}{4}\right); (-1,0)$

b. $VA: x = -3;\ HA: y = 1;\ intercepts\ (0,0)$

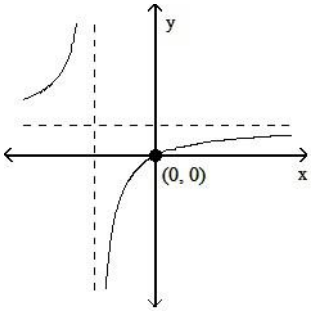
c. $VA: x = 1, x = -4;\ HA: y = 2;\ intercepts\ (0,0); \left(\frac{1}{2}, 0\right)$

d. $VA: x = 1;\ SA: y = x - 1;\ intercepts\ (0,3); (3,0), (-1,0)$

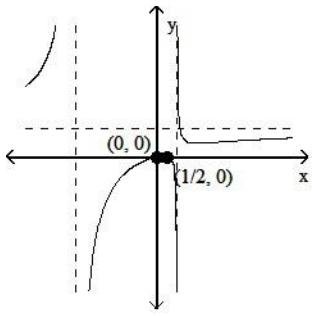
a.



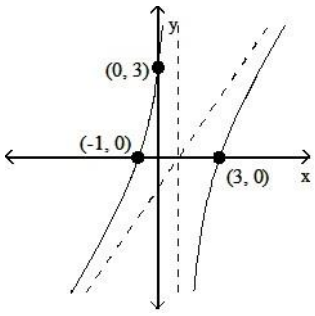
b.



c.



d.



33. a. $(5,-1)$ b. $(4,-1)$ c. $\left(\frac{208}{17}, \frac{88}{17}\right)$ d. $(x,y)|y = -2x - \frac{3}{2}$ e. No solution

34. a. $\begin{bmatrix} -1 & -1 & -2 \\ -3 & 10 & 2 \end{bmatrix}$ b. $\begin{bmatrix} 3 & -1 & 8 \\ 3 & 2 & 16 \end{bmatrix}$ c. $\begin{bmatrix} 7 & -3 & 19 \\ 6 & 10 & 41 \end{bmatrix}$

35. a, b, and c not possible.

36. $D = -13;\ \ Dx = -65;\ \ Dy = 13;\quad Solution\ (5, -1)$

37. a. 6 b. 2 c. 3, 5 d. -1 e. (4, 0) f. (0, 2) g. $(-\infty, \infty)$ h. $[0, \infty)$

Multiple Choice View of Questions:

M1. D M2. A M3. D M4. D
M5. B M6. D M7. D M8. C