Math 1314 Review 1(answers)

Solve the following polynomial equations by factoring.

1. $2x^2+15x=8$

$2x^2+15x-8=0$

$(2x-1)(x+8)=0$

$\boxed{\frac{1}{2},-8}$

2. $2x^4=50x^2$

$2x^4-50x^2=0$

$2x^2(x^2-25)=0$

$2x^2(x+5)(x-5)=0$

$\boxed{0,5,-5}$

3. $2x^3-x^2-18x+9=0$

$2x^3-x^2-18x+9=0$

$(2x^3-x^2)-(18x-9)=0$

$x^2(2x-1)-9(2x-1)=0$

$(2x-1)(x+3)(x-3)=0$

$\boxed{\frac{1}{2},3,-3}$

Solve the following equations by the square root method.

4. $2x^2+3=-125$

$2x^2=-128$

$x^2=-64$

$x=\pm\sqrt{-64}$

$\boxed{\pm 8i}$

5. $(3x-4)^2=18$

$(3x-4)^2=18$

$3x-4=\pm\sqrt{18}$

$3x-4=\pm 3\sqrt{2}$

$3x=4\pm 3\sqrt{2}$

$\boxed{\frac{4\pm 3\sqrt{2}}{3}}$

Solve the following equations by completing the square.

6. $x^2-12x+27=0$

$x^2-12x=-27$

$x^2-12x+36=-27+36$

$(x-6)^2=9$

$x-6=\pm\sqrt{9}$

$x=6\pm 3$

$\boxed{9,3}$

7. $3x^2+12x+11=0$

$3x^2+12x+11=0$

$3x^2+12x=-11$

$x^2+4x=-\frac{11}{3}$

$x^2+4x+4=-\frac{11}{3}+4$

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

$x+2=\pm\sqrt{\frac{1}{3}}$

$\boxed{-2\pm\frac{\sqrt{3}}{3}}$

Solve the following equations using the quadratic formula.

8. $x^2-2x+19=0$

$$\frac{2\pm\sqrt{4-76}}{2}$$

$$\frac{2\pm\sqrt{-72}}{2}$$

$$\frac{2\pm 6\sqrt{2}i}{2}$$

$$\boxed{1\pm 3\sqrt{2}i}$$

9. $2x^2=3-4x$

$$2x^2+4x-3=0$$

$$\frac{-4\pm\sqrt{16+24}}{4}$$

$$\frac{-4\pm\sqrt{40}}{4}$$

$$\frac{-4\pm 2\sqrt{10}}{4}$$

$$\boxed{\frac{-2\pm\sqrt{10}}{2}}$$

Use the discriminant to determine the number and type of solutions for the following.

10. $x^2-4x+13=0$

$$b^2-4ac=16-52<0$$

so $\boxed{\text{two imaginary solutions}}$

11. $9x^2=2-3x$

$$9x^2+3x-2=0$$

$$b^2-4ac=9+72>0$$

so $\boxed{\textit{two real solutions}}$

Solve the following radical equations.

12. $\sqrt{2x-3}+x=3$

$$\sqrt{2x-3}=3-x$$

$$\left(\sqrt{2x-3}\right)^2=(3-x)^2$$

$$2x-3=9-6x+x^2$$

$$0=x^2-8x+12$$

$$0=(x-6)(x-2)$$

$$\boxed{2}$$

13. $\sqrt{x-4}+\sqrt{x+1}=5$

$$\sqrt{x-4}=5-\sqrt{x+1}$$

$$\left(\sqrt{x-4}\right)^2=\left(5-\sqrt{x+1}\right)^2$$

$$x-4=25-10\sqrt{x+1}+x+1$$

$$-30=-10\sqrt{x+1}$$

$$3=\sqrt{x+1}$$

$$3^2=\left(\sqrt{x+1}\right)^2$$

$$9=x+1$$

$$\boxed{8}$$

Solve the following quadratic-like equations.

14. $x^4 - 5x^2 + 4 = 0$

$\text{let } z = x^2$

$z^2 - 5z + 4 = 0$

$(z-1)(z-4) = 0$

$z = 1, 4$

$x^2 = 1, x^2 = 4$

$\boxed{\pm 1, \pm 2}$

15. $x^{\frac{1}{2}} + 3x^{\frac{1}{4}} - 10 = 0$

$\text{let } z = x^{\frac{1}{4}}$

$z^2 + 3z - 10 = 0$

$(z+5)(z-2) = 0$

$z = -5, 2$

$x^{\frac{1}{4}} = -5, x^{\frac{1}{4}} = 2$

$\boxed{16}$

Solve the following absolute value equations.

16. $|2x+1| = 7$

$2x + 1 = \pm 7$

$2x = -1 \pm 7$

$x = \dfrac{-1 \pm 7}{2}$

$\boxed{-4, 3}$

17. $2|x-3| + 6 = 4$

$2|x-3| = -2$

$|x-3| = -1$

so $\boxed{\text{no solution}}$

Solve the following equations using any method you want.

18. $(3x+5)(x-3) = 5$

$(3x+5)(x-3) = 5$

$3x^2 - 4x - 15 = 5$

$3x^2 - 4x - 20 = 0$

$(3x-10)(x+2) = 0$

$\boxed{\dfrac{10}{3}, -2}$

19. $(x^2 - x)^2 - 14(x^2 - x) + 24 = 0$

$\text{let } z = x^2 - x$

$z^2 - 14z + 24 = 0$

$(z-2)(z-12) = 0$

$z = 2, 12$

$x^2 - x = 2, x^2 - x = 12$

$x^2 - x - 2 = 0, x^2 - x - 12 = 0$

$(x-2)(x+1) = 0, (x-4)(x+3) = 0$

$\boxed{2, -1, 4, -3}$

Solve the following inequalities.

20. $-6x+3\le 15$

$-6x\le 12$

$x\ge -2$

$\boxed{[-2,\infty)}$

21. $7<2x+3\le 9$

$4<2x\le 6$

$2<x\le 3$

$\boxed{(2,3]}$

22. $|2x+3|\le 0$

$2x+3=0$

$2x=-3$

$\boxed{-\frac{3}{2}}$

23. $-4|x+2|+5\le -7$

$-4|x+2|\le -12$

$|x+2|\ge 3$

$x+2\le -3, x+2\ge 3$

$x\le -5, x\ge 1$

$\boxed{(-\infty,-5],[1,\infty)}$

Evaluate the function $f(x)=\begin{cases}\sqrt{x-4}\,; x\ge 4\\ 4-x\;\; ; x<4\end{cases}$ *at the indicated value.*

24. $f(13)$

$13\ge 4$

$\sqrt{13-4}$

$\sqrt{9}$

$\boxed{3}$

25. $f(0)$

$0<4$

$4-0$

$\boxed{4}$

26. $f(-3)$

$-3<4$

$4-(-3)$

$\boxed{7}$

27. $f(4+x^2)$

$4+x^2\ge 4$

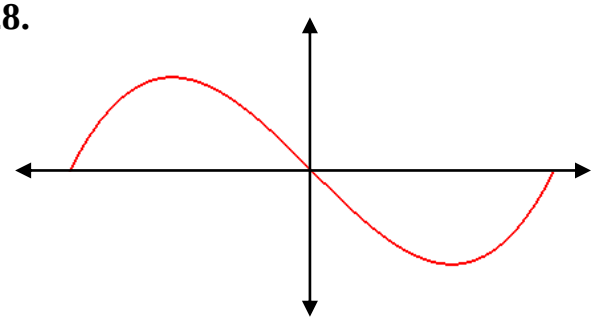
$\sqrt{4+x^2-4}$

$\sqrt{x^2}$

$\boxed{|x|}$

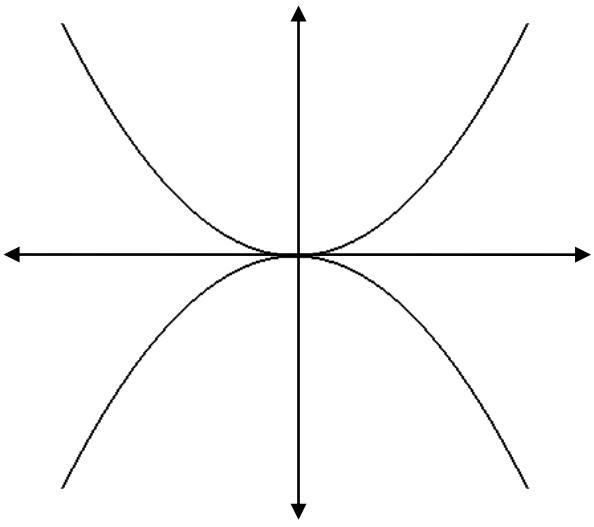
Use the vertical line test to determine if the graph is of a function of x.

28.



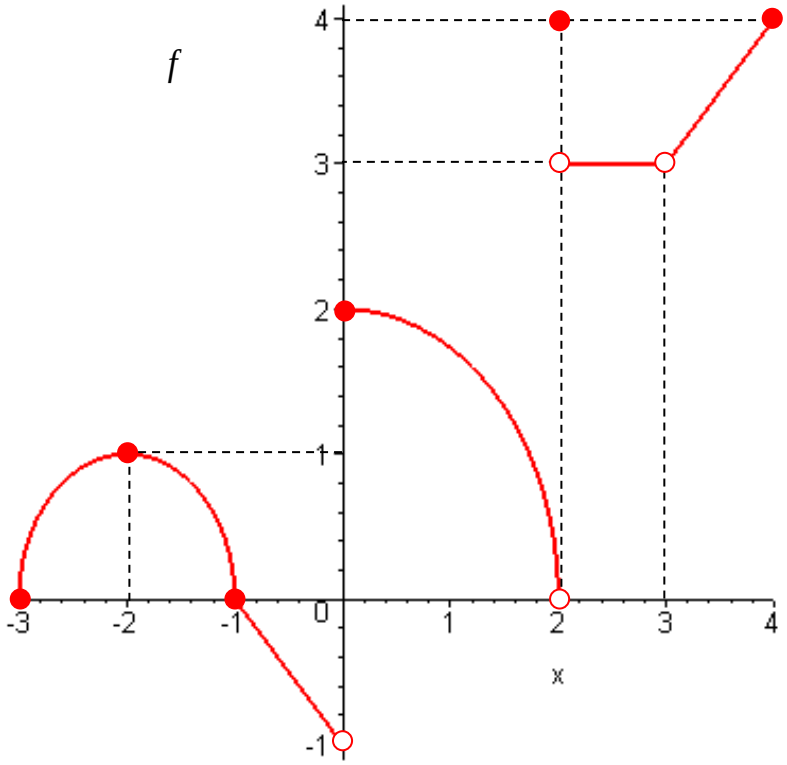
Is a function

29.



Is not a function

Use the given graph of the function f on the interval $[-3,4]$ *to determine the following:*



30. The domain of *f*
$[-3,3),(3,4]$

31. The range of *f*
$(-1,2],[3,4]$

32. The *x*-intercepts
$-3,-1$

33. The *y*-intercept
2

34. The intervals where *f* is increasing
$[-3,-2],(3,4]$

35. The intervals where *f* is decreasing
$[-2,0),[0,2)$

36. The intervals where *f* is constant
$(2,3)$

37. Where *f* has local maxima
$x=-2,0,2$

38. Where *f* has local minima
nowhere

39. $f(0)$
2

40. $f(2)$
4

41. $f(3)$
Undefined

42. $f\left(\frac{5}{2}\right)$
3

43. $f\left(-\frac{1}{2}\right)$
$-\frac{1}{2}$

44. The solutions of the equation $f(x)=4$

$x=2,4$

45. The solutions of the inequality $f(x)<0$

$-1<x<0$ or $(-1,0)$

Determine if the following functions are even, odd, or neither.

46. $f(x)=x^3-5x$

$$\begin{aligned} f(-x) &= (-x)^3-5(-x) \\ &= -x^3+5x \\ &= -\left(x^3-5x\right) \\ &= -f(x) \end{aligned}$$

so it's $\boxed{\text{odd}}$

47. $g(x)=x^4-x+2$

$$\begin{aligned} g(-x) &= (-x)^4-(-x)+2 \\ &= x^4+x+2 \\ &\neq g(x) \\ &\neq -g(x) \end{aligned}$$

so it's $\boxed{\text{neither}}$

48. $h(x)=x\sqrt[3]{x}$

$$\begin{aligned} h(-x) &= (-x)\sqrt[3]{(-x)} \\ &= (-x)\sqrt[3]{x}\cdot\sqrt[3]{-1} \\ &= (-x)\sqrt[3]{x}\cdot(-1) \\ &= x\sqrt[3]{x} \\ &= h(x) \end{aligned}$$

so it's $\boxed{\text{even}}$