In 32 - 33, find all the zeros of each function.

32. $g(x)=x^3-x^2-x+1$

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

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

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

$x=\{1,-1\}$

33. $h(x)=x^4-4x^3-9x^2+16x+20$

$x=2, 5, -2, -1$

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

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

$x=-2,-1$

2]	1	-4	-9	16	20
		2	-4	-26	-20
	1	-2	-13	-10	0
5]		5	15	10	
	1	3	2	0	

34. Solve $x^4-9x^3+39x^2-225x+350=0$ if $5i$ is a root

$(x-5i)(x+5i)=x^2+25$

$x^2-9x+14=0$

$(x-2)(x-7)=0$

$x=7, 2, \pm 5i$

$x^2+25 \;\big|\; x^4-9x^3+39x^2-225x+350$

$x^2-9x+14$

$-x^4 \quad +25x^2$

$-9x^3+14x^2-225x$

$+9x^3 \quad +225x$

$14x^2+350$

$-14x^2+350$

0

35. List the possible rational zeros of $h(x)=-3x^4-5x^3-3x^2+7x+8$ using the rational root theorem.

possible rational zeros: $\pm 1, \pm 2, \pm 4, \pm 8, \pm \frac{1}{3}, \pm \frac{2}{3}, \pm \frac{4}{3}, \pm \frac{8}{3}$

36. Identify the leading coefficient, degree and end behavior of $r(x)=-6x^4+4x^3-x^2+1$

L.C $=-6$

degree : 4

as $x \to \infty$, $f(x) \to -\infty$

as $x \to -\infty$, $f(x) \to -\infty$

In 37 – 39, write the simplest polynomial function with the given roots.

37. $-\frac{1}{2}, -2, 3$

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

$f(x)=(x+\frac{1}{2})(x^2-x-6)$

$f(x)=x^3-\frac{1}{2}x^2-\frac{13}{2}x-3$

38. $-3, i$

$f(x)=(x+3)(x-i)(x+i)$

$=(x+3)(x^2+1)$

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

39. $1+\sqrt{3}, 2i$

$f(x)=(x-(1+\sqrt{3}))(x-(1-\sqrt{3}))(x-2i)(x+2i)$

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

$f(x)=x^4-2x^3+2x^2-8x-8$

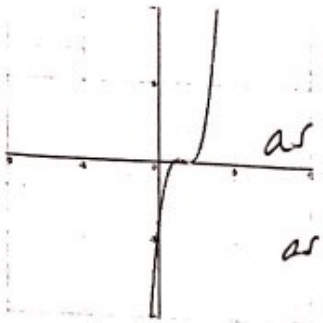
$[(x-1)-\sqrt{3}][(x-1)+\sqrt{3}]$

$(x-1)^2-3$

$x^2-2x+1-3$

In 40 – 41, determine whether the function graphed has an odd or even degree and a positive or negative leading coefficient. Then, describe the end behavior.

40.



as $x \to \infty$, $f(x) \to \infty$

as $x \to -\infty$, $f(x) \to -\infty$

odd, positive

41.

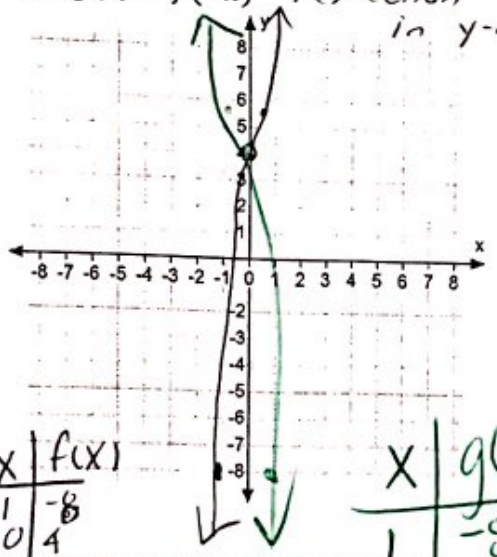
even, negative

as $x \to \infty$, $f(x) \to -\infty$

as $x \to -\infty$, $f(x) \to -\infty$

Let $f(x) = 12x^3 + 4$. Graph $f(x)$ and $g(x)$ on the same coordinate plane. Describe $g(x)$ as a transformation of $f(x)$.

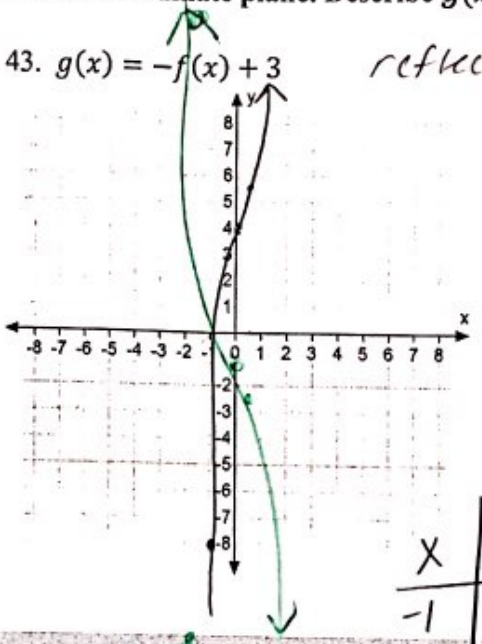
42. $g(x) = f(-x)$ reflection in y-axis



x	f(x)
-1	-8
0	4
1/2	5.5

x	g(x)
1	-8
0	4
-1/2	5.5

43. $g(x) = -f(x) + 3$ reflection in x-axis, shift up 3



x	g(x)
-1	11
0	-1
1/2	-2.5

x	f(x)
-1	-8
0	4
1/2	5.5

In 44 - 46, simplify completely. Assume that all expressions are defined.

44. $\dfrac{x^2-4x+4}{5x^2-9x-2} = \dfrac{(x-2)(x-2)}{(5x+1)(x-2)} = \dfrac{x-2}{5x+1}$

45. $\dfrac{x}{x^2-1} \cdot \dfrac{x^2-5x+4}{2x^2+2x} \div \dfrac{x^2-16}{2x} = \dfrac{x}{(x+1)(x-1)} \cdot \dfrac{(x-4)(x-1)}{2x(x+1)} \cdot \dfrac{2x}{(x+4)(x-4)}$

$\dfrac{x}{(x+4)(x+1)^2}$

46. $\dfrac{3}{x^2-7x+12} + \dfrac{5x}{x-4}$ LCD: $(x-4)(x-3)$

$\dfrac{3}{(x-4)(x-3)} + \dfrac{5x(x-3)}{(x-4)(x-3)} = \dfrac{5x^2-15x+3}{(x-4)(x-3)} =$

In 47 - 48, solve each equation.

47. $3 = \frac{2}{x} - \frac{4}{3x}$ LCD: $3x$

$9x = 6 - 4$ $\quad 9x = 2$ $\quad x = 2/9$

48. $\frac{1}{x+1} + \frac{1}{x-1} = \frac{2}{x^2-1}$ LCD: $(x+1)(x-1)$

$x - 1 + x + 1 = 2$

$2x = 2$ $\quad x = 1$ No solution

49. The monthly minimum payment p due on a certain credit card with a fixed rate varies directly as the balance b, and $p = \$19.80$ when $b = \$1100$. Find p when $b = \$3000$.

$K = 0.018$

$p = kb$ $\quad k = \frac{p}{b}$

$\frac{19.80}{1100} = \frac{p}{3000}$ $\quad 1100p = 59400$

$p = \$54$

50. The time t that it takes Hannah to bike to school varies inversely as her average speed s. If she can bike to school in 25 min when her average speed is 6mi/h, what would her average speed need to be to get to school in 20 min?

$t = \frac{k}{s}$ $\quad k = ts$

$25(6) = 20s$

$150 = 20s$

$s = 7.5$ mph