PC - Functions Name KEY

Graphing & Finding Domain for High Powered Polynomials

Find the domain for each radical. Start by factoring the polynomial, graphing the polynomial, and finding positive intervals greater than or equal to zero.

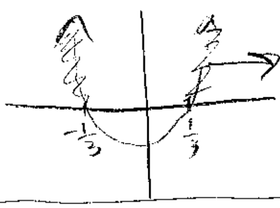
1) $f(x)=\sqrt{27x^2-3}$

$27x^2-3 \geq 0$

$3(9x^2-1) \geq 0$

$3(3x-1)(3x+1) \geq 0$

$x=\frac{-1}{3},\ x=\frac{1}{3}$



$D: (-\infty, -\frac{1}{3}] \cup [\frac{1}{3}, \infty)$

2) $f(x)=\sqrt{-27x^2-36x-12}$

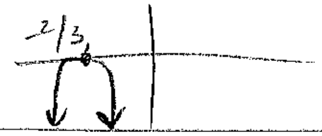
$-27x^2-36x-12 \geq 0$

$-3(9x^2+12x+4) \geq 0$

$-3(3x+2)(3x+2) \geq 0$

$-3(3x+2)^2 \geq 0$

$x=-\frac{2}{3}$ (bounce)



$D: [-\frac{2}{3}]$

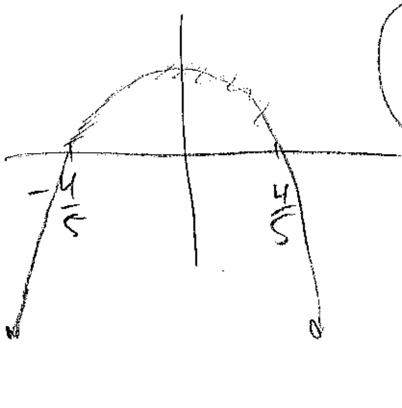
3) $f(x)=\sqrt{-25x^2+16}$

$-25x^2+16 \geq 0$

$-1(25x^2-16) \geq 0$

$-1(5x-4)(5x+4) \geq 0$

$x=\frac{-4}{5},\ x=\frac{4}{5}$



$D: [\frac{-4}{5}, \frac{4}{5}]$

4) $f(x)=\sqrt{12x^2+36x+27}$

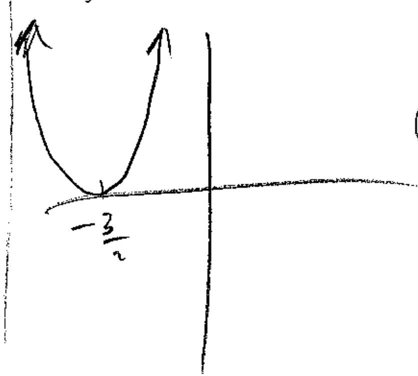
$12x^2+36x+27 \geq 0$

$3(4x^2+12x+9) \geq 0$

$3(2x+3)(2x+3) \geq 0$

$3(2x+3)^2 \geq 0$

$x=-\frac{3}{2}$ (bounce)



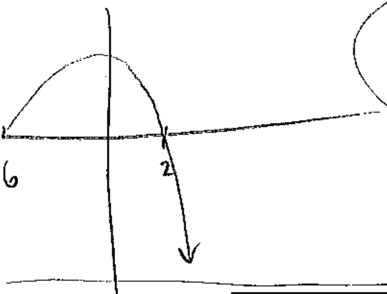
$D: (-\infty, \infty)$

5) $f(x)=\sqrt{-2x^2-8x+24}$

$-2(x^2+4x-12)\geq 0$

$-2(x+6)(x-2)\geq 0$

$x=-6,\ x=2$



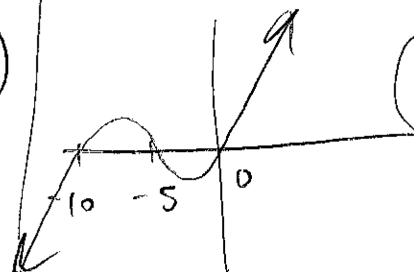
$D: [6, 2]$

6) $f(x)=\sqrt{2x^3+30x^2+100x}$

$2x(x^2+15x+50)\geq 0$

$2x(x+5)(x+10)\geq 0$

$x=0,\ x=-5,\ x=-10$



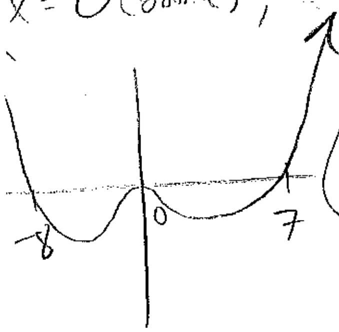
$D: [-10,-5]\cup[0,\infty)$

7) $f(x)=\sqrt{x^4+x^3-56x^2}$

$x^2(x^2+x-56)\geq 0$

$x^2(x+8)(x-7)\geq 0$

$x=0$ (bounce), $x=-8,\ x=7$



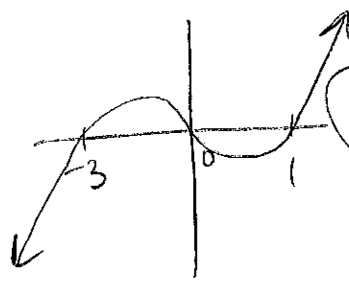
$D: (-\infty,-8]\cup[0]\cup[7,\infty)$

8) $f(x)=\sqrt{x^3+2x^2-3x}$

$x(x^2+2x-3)\geq 0$

$x(x+3)(x-1)\geq 0$

$x=0,\ x=-3,\ x=1$



$D: [-3,0]\cup[1,\infty)$

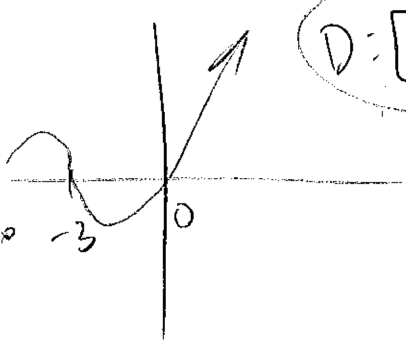
9) $f(x)=\sqrt{x^3+9x^2+18x}$

$x(x^2+9x+18)\geq 0$

$x(x+6)(x+3)\geq 0$

$x=0,\ x=-6,\ x=-3$

$D: [-6,-3]\cup[0,\infty)$

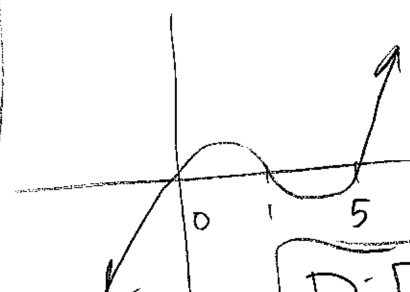


10) $f(x)=\sqrt{x^3-6x^2+5x}$

$x(x^2-6x+5)\geq 0$

$x(x-5)(x-1)\geq 0$

$x=0,\ x=5,\ x=1$



$D: [0,1]\cup[5,\infty)$

11) $f(x)=\sqrt{7x^3-6x^2-7x+6}$

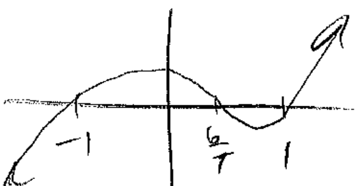
$7x^3-6x^2-7x+6 \geq 0$

-6	$-6x^2$	6
$7x$	$7x^3$	$-7x$
	x^2	-1

$(7x-6)(x^2-1) \geq 0$

$(7x-6)(x+1)(x-1) \geq 0$

$x=\frac{6}{7},\ x=-1,\ x=1$



$D: [-1, \frac{6}{7}] \cup [1, \infty)$

12) $f(x)=\sqrt{-x^4-3x^3+4x}$; $f(-2)=0$

$-x^4-3x^3+4x \geq 0$

$-x(x^3+3x^2-4) \geq 0$

$$\begin{array}{r|l} & x^2+x-2 \\ \hline x+2 & x^3+3x^2+0x-4 \\ & -(x^3+2x^2) \\ & \quad x^2+0x \\ & \quad -(x^2+2x) \\ & \qquad -2x-4 \\ & \qquad -(-2x-4) \\ & \qquad 0 \end{array}$$

$-x(x+2)(x^2+x-2) \geq 0$

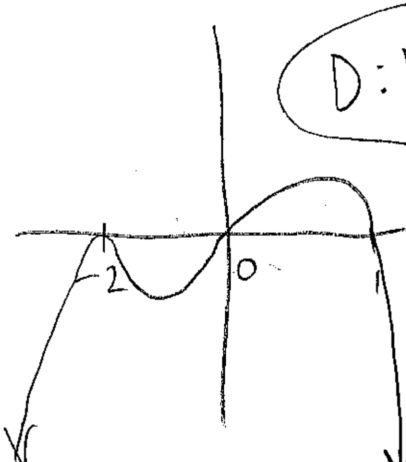
$-x(x+2)(x+2)(x-1) \geq 0$

$-x(x+2)^2(x-1) \geq 0$

$x=0,\ x=-2$ (bounce), $x=1$

Deg 4 $(-a)$

$D: [-2] \cup [0,1]$



13) $f(x)=\sqrt{x^4-x^3-3x^2+x+2}$; $f(2)=0$

$x^4-x^3-3x^2+x+2 \geq 0$

$$\begin{array}{r|l} & x^3+x^2-x-1 \\ \hline x-2 & x^4-x^3-3x^2+x+2 \\ & -(x^3-2x^3) \\ & \quad x^3-3x^2 \\ & \quad -(x^3-2x^2) \\ & \qquad -x^2+x \\ & \qquad -(-x^2+2x) \\ & \qquad\quad -1x+2 \\ & \qquad\quad -(-1x+2) \\ & \qquad\quad 0 \end{array}$$

$(x-2)(x^3+x^2-x-1) \geq 0$

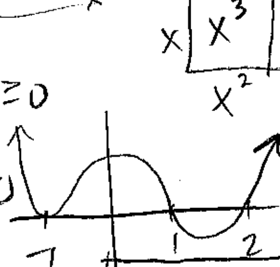
1	x^2	-1
x	x^3	$-x$
	x^2	-1

$(x-2)(x+1)(x^2-1) \geq 0$

$(x-2)(x+1)(x+1)(x-1) \geq 0$

$(x-2)(x+1)^2(x-1) \geq 0$

$x=2,\ x=-1$ bounce, $x=1$



$D: (-\infty, 1] \cup [2, \infty)$

14) $f(x)=\sqrt{x^5-5x^4-8x^3+40x^2+7x-35}$; $f(5)=0$

$$\begin{array}{r|l} & x^4-8x^2+7 \\ \hline x-5 & x^5-5x^4-8x^3+40x^2+7x-35 \\ & -(x^5-5x^4) \\ & \quad 0 \quad -8x^3+40x^2 \\ & \quad -(-8x^3+40x^2) \\ & \qquad 0 \quad 7x-35 \\ & \qquad -(7x-35) \\ & \qquad\quad 0 \end{array}$$

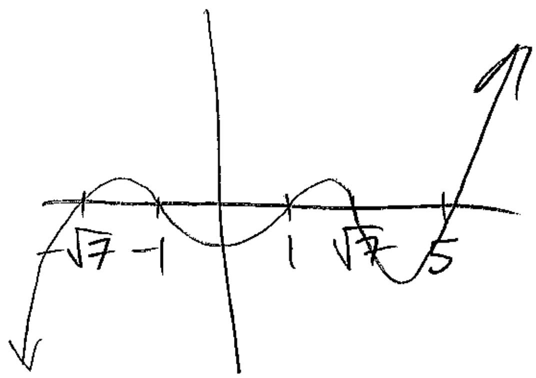
$$D: [-\sqrt{7},-1]\cup[1,\sqrt{7}]\cup[5,\infty)$$

$(x-5)(x^4-8x^2+7)\geq 0$

$(x-5)(x^2-1)(x^2-7)\geq 0$

$(x-5)(x+1)(x-1)(x^2-7)\geq 0$

$x=5,\ x=-1,\ x=1,\ x=\pm\sqrt{7}$



15) $f(x)=\sqrt{x^4+3x^3+64x+192}$; $f(-3)=0$

Could use grouping strategy!

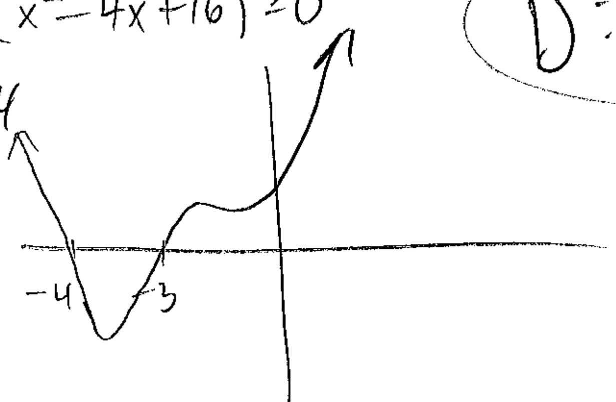
$$\begin{array}{r|l} & x^3+64 \\ \hline x+3 & x^4+3x^3+0x^2+64x+192 \\ & -(x^4+3x^3) \\ & \qquad 64x+192 \\ & \qquad -(64x+192) \\ & \qquad\qquad 0 \end{array}$$

$(x+3)(x^3+64)\geq 0$

$(x+3)(x+4)(x^2-4x+16)\geq 0$

$$D: (-\infty,-4]\cup[-3,\infty)$$

$x=-3,\ x=-4$



16) $f(x)=\sqrt{-x^5+2x^4+8x^3-16x^2-16x+32};\ f(2)=0$

$$-1(x^5-2x^4-8x^3+16x^2+16x-32)\geq 0$$

$$x^4-8x^2+16$$

$$x-2 \,\overline{\big)\, x^5-2x^4-8x^3+16x^2+16x-32}$$

$$\underline{-(x^5-2x^4)}$$

$$0$$

$$-8x^3+16x^2$$

$$\underline{-(-8x^3+16x^2)}$$

$$0$$

$$16x-32$$

$$\underline{-(16x-32)}$$

$$0$$

$$-1(x-2)(x^4-8x^2+16)\geq 0$$

$$-1(x-2)(x^2-4)(x^2-4)\geq 0$$

$$-1(x-2)(x+2)(x-2)(x+2)(x-2)\geq 0$$

$$-1(x-2)^3(x+2)^2\geq 0$$

$x=2$ (curve), $x=-2$ (bounce)

$D:(-\infty,2]$