Polynomial Functions Review Worksheet KEY

Problems 1 through 6 refer to the following functions:

$f(x)=3x^4-2x^2+x-4$, $g(x)=2x^5-4x^3$, $h(x)=-3x^4-2$, $p(x)=x^3+6x^2+11x+6$

1. Determine the maximum number of relative extrema for each polynomial.

f: 3, *g*: 4, *h*: 3, *p*: 2

2. Determine the number of possible positive and negative zeros for each polynomial.

$f(-x)=3x^4-2x^2-x-4$, $g(-x)=-2x^5+4x^3$, $h(-x)=-3x^4-2$, $p(-x)=-x^3+6x^2-11x+6$

	f	***g***	***h***	***p***
pos	3 or 1	1	0	0
neg	1	1	0	3 or 1

3. Determine whether each polynomial is even, odd, or neither.

f: neither, *g*: odd, *h*: even, *p*: neither

4. List the possible rational zeros for each polynomial.

$f:\{\pm4,\pm2,\pm1,\pm\frac{4}{3},\pm\frac{2}{3},\pm\frac{1}{3}\}, g:\{0\}, h:\{\pm2,\pm1,\pm\frac{2}{3},\pm\frac{1}{3}\}, p:\{\pm6,\pm3,\pm2,\pm1\}$

5. Find the zeros of $p(x)$.

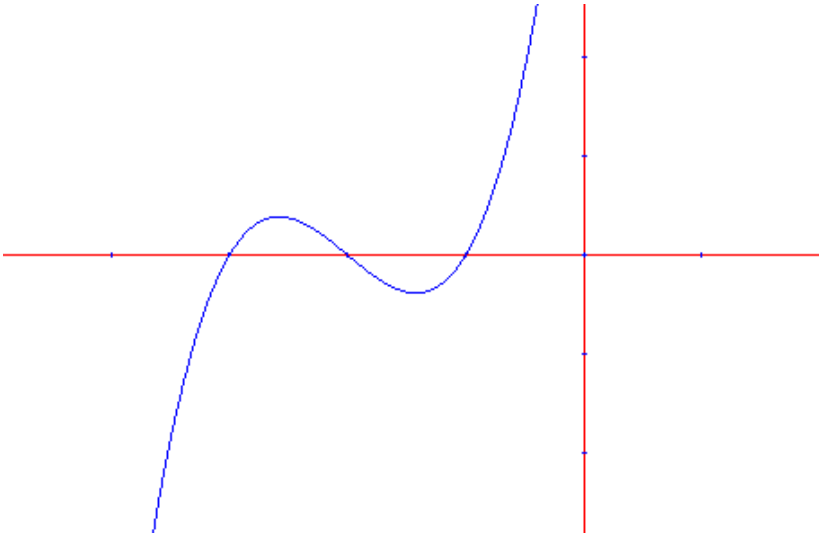
$$\begin{array}{r|cccc} -1 & 1 & 6 & 11 & 6 \\ & & -1 & -5 & -6 \\ \hline & 1 & 5 & 6 & 0 \end{array}$$

$x^2+5x+6=0$

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

$x=-1,-2,-3$

6. Graph $p(x)$.

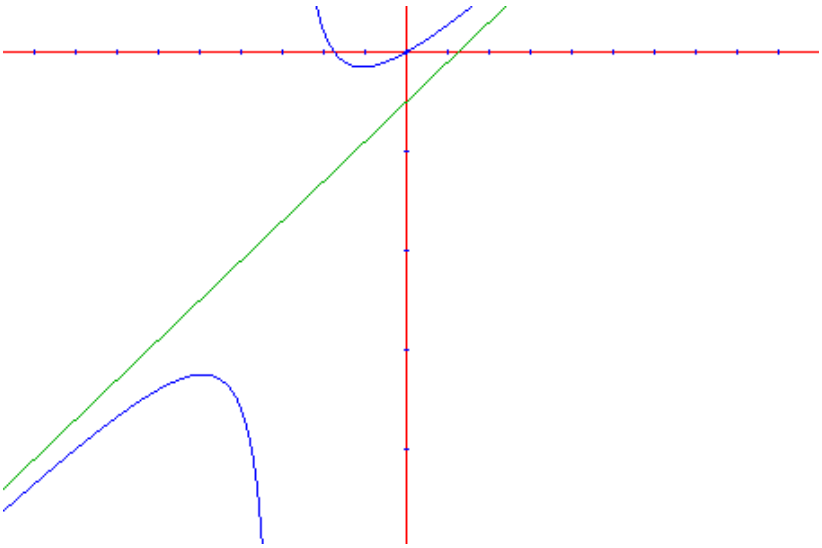


7. Graph $m(x)=\dfrac{4x^2+7x}{x+3}$ and determine its asymptotes.

$$\begin{array}{r|rrr} -3 & 4 & 7 & 0 \\ & & -12 & 15 \\ \hline & 4 & -5 & 15 \end{array}$$

$y=4x-5$ is a slant (oblique) asymptote

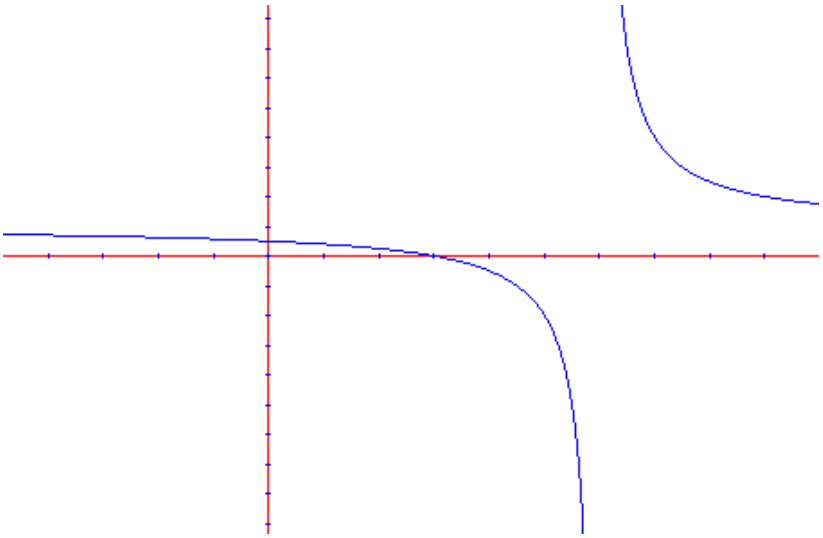
$x=-3$ is a vertical asymptote



8. Graph $n(x)=\dfrac{x^2-2x-3}{x^2-5x-6}$ and determine its asymptotes.

$y=1$ is a horizontal asymptote

$\dfrac{x^2-2x-3}{x^2-5x-6}=\dfrac{(x-3)(x+1)}{(x-6)(x+1)}=\dfrac{x-3}{x-6}$ $x=6$ is a vertical asymptote and $x=-1$ is a discontinuity



9. Solve $\sqrt{x+4}+\sqrt{5x}=8$.

$\sqrt{x+4}+\sqrt{5x}=8$
$\sqrt{x+4}=8-\sqrt{5x}$
$x+4=64-16\sqrt{5x}+5x$
$16\sqrt{5x}=4x+60$
$256(5x)=16x^2+480x+3600$
$0=16x^2-800x+3600$
$0=16(x^2-50x+225)$
$0=16(x-45)(x-5)$
$x=45,5$

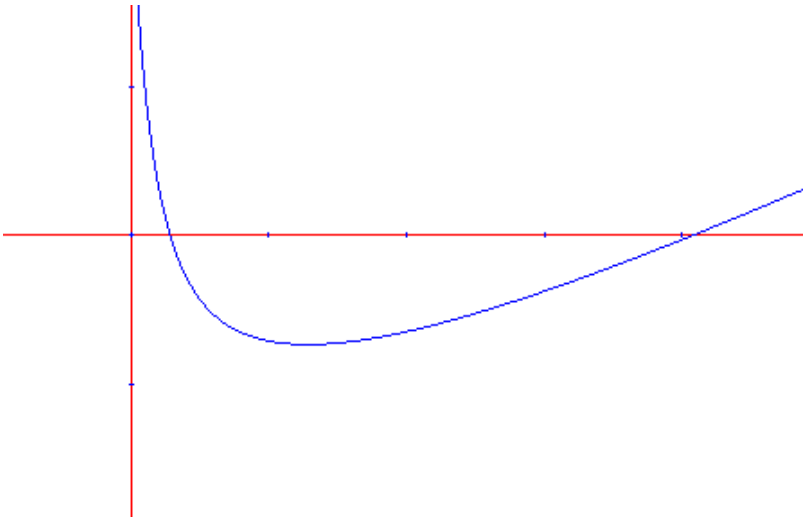
$x=5$ (45 is an extraneous root)

10. Solve $\sqrt[3]{2x-5}+6=11$.

$\sqrt[3]{2x-5}+6=11$
$\sqrt[3]{2x-5}=5$
$2x-5=125$
$2x=130$
$x=65$

11. Solve $\sqrt[3]{x^2-x+8}+1=2\sqrt{x}$ to the nearest hundredth.

Solve graphically to find $x = 2.82, 40.85$



12. Decompose $\dfrac{8}{x^3-6x^2+8x}$ into partial fractions.

$$\frac{8}{x(x-4)(x-2)}=\frac{A}{x}+\frac{B}{x-4}+\frac{C}{x-2}$$

$$8=A(x-4)(x-2)+B(x)(x-2)+C(x)(x-4)$$

$$8=A(8) \quad 8=B(8) \quad 8=C(-4)$$

$$A=1 \qquad B=1 \qquad C=-2$$

$$\frac{1}{x}+\frac{1}{x-4}+\frac{-2}{x-2}$$

13. Decompose $\dfrac{-2x^2+14x-15}{(x-1)(x-2)^2}$ into partial fractions.

$$\frac{-2x^2+14x-15}{(x-1)(x-2)^2}=\frac{A}{x-1}+\frac{B}{x-2}+\frac{C}{(x-2)^2}$$

$$-2x^2+14x-15=A(x-2)^2+B(x-1)(x-2)+C(x-1)$$

$$-2+14-15=A \quad -8+28-15=C \quad -15=-3(4)+B(2)+5(-1)$$

$$A=-3 \qquad C=5 \qquad 2=2B$$

$$B=1$$

$$\frac{-3}{x-1}+\frac{1}{x-2}+\frac{5}{(x-2)^2}$$