Polynomials WS 2 Name: Per:

Graph the following:

1. $f(x) = (x-1)(x+2)^2$
   (a) zeros (note multiplicity):
   (b) graph

2. $\dfrac{5x^2-20}{3x^3-2x^2}$
   (a) zeros: (find when numerator is zero)
   (b) vertical asymptotes: (is denominator zero?)
   (c) hoizontal/oblque asymptotes: (look at degree of n and m, divide if improper)
   (d) Graph:

3. $\dfrac{3x^2+7x+2}{3x^2-2x-1}$
   (a) zeros: (find when numerator is zero)
   (b) vertical asymptotes: (is denominator zero?)
   (c) hoizontal/oblque asymptotes: (look at degree of n and m, divide if improper)
   (d) Graph:

4. $\dfrac{6x^4+6x^3-18x^2-6x+12}{(3x+2)(x+1)(x-1)}$

(a) zeros: (find when numerator is zero– use synthetic division rather than factoring....try dividing $\pm1, \pm2, ...$, looking for a zero remainder)

(b) vertical asymptotes: (is denominator zero?)

(c) hoizontal/oblque asymptotes: (look at degree of n and m, divide if improper)

(d) Graph:

5. $\dfrac{2x^4+2x^3-6x^2-2x+4}{6x^2+5x}$

(a) zeros: (find when numerator is zero)

(b) vertical asymptotes: (is denominator zero?)

(c) hoizontal/oblque asymptotes: (look at degree of n and m, divide if improper)

(d) Graph:

HINTS

5a. $6x^4+6x^3-18x^2-6x+12 = 6(x-1)^2(x+1)(x+2)$

4c. $(3x+2)(x+1)(x-1) = 3x^3+2x^2-3x-2$

2a. $2x^4+2x^3-6x^2-2x+4 = (2x+4)(x+1)(x-1)$

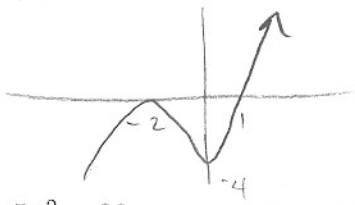
Polynomials WS 2 (for Section 5.2) Name: Key Per:

Graph the following:

1. $f(x) = (x-1)(x+2)^2$

   (a) zeros (note multiplicity): 1, -2, -2

   (b) graph



2. $\dfrac{5x^2-20}{3x^3-2x^2} = \dfrac{5(x-2)(x+2)}{x^2(3x-2)}$

   (a) zeros: (find when numerator is zero)

   -2 and 2

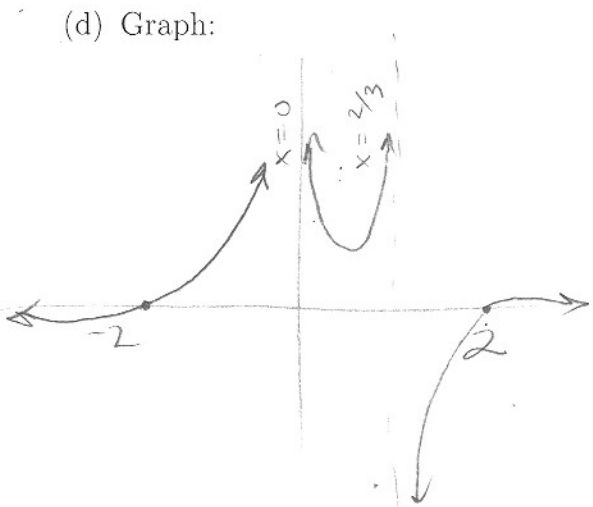
   (b) vertical asymptotes: (is denominator zero?)

   $x = 0$ and $x = \frac{2}{3}$

   (c) hoizontal/oblque asymptotes: (look at degree of n and m, divide if improper) $n < m$ so....

   $y = 0$

   (d) Graph:



3. $\dfrac{3x^2+7x+2}{3x^2-2x-1} = \dfrac{(3x+1)(x+2)}{(3x+1)(x-1)}$

   (a) zeros: (find when numerator is zero)

   -2

   (Removable discont. at $\frac{-1}{3}$

   (b) vertical asymptotes: (is denominator zero?)

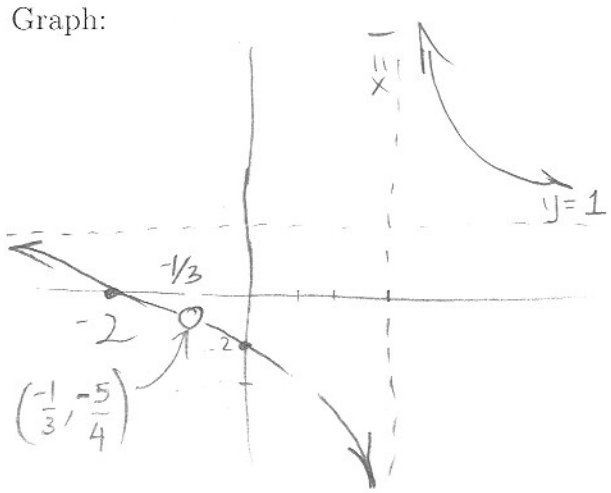
   $x = 1$

   (Removable discontinuity at $-\frac{1}{3}$,,, at $x = \frac{-1}{3}$ $\dfrac{(\frac{-1}{3}+2)}{(\frac{-1}{3}-1)} = \frac{5}{3} \cdot \ldots = \frac{-5}{4}$

   (c) hoizontal/oblque asymptotes: (look at degree of n and m, divide if improper) $n = m$ so.... $y = \frac{a}{b}$,,,,

   $y = \frac{3}{3} = 1$

   (d) Graph:



4. $\dfrac{6x^4+6x^3-18x^2-6x+12}{(3x+2)(x+1)(x-1)} = \dfrac{6(x-1)^2(x+1)(x+2)}{(3x+2)(x+1)(x-1)}$

(a) zeros: (find when numerator is zero– use synthetic division rather than factoring....try dividing $\pm1, \pm2, \ldots$, looking for a zero remainder)

1 | 6 6 -18 -6 12
6 12 -6 -12
6 12 -6 -12 0

so 1 is zero.

(-1) | 6 12 -6 -12
-6 -6 12
6 6 -12 0

-2 | 6 6 -12
-12 12
6 -6 0

$6x-6=0$
$x=1$

So zero at 1 has multiplicity of 2

(b) vertical asymptotes: (is denominator zero?)

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

$x=-1$ – Removable discontinuity

$x=1$ – Removable discontinuity

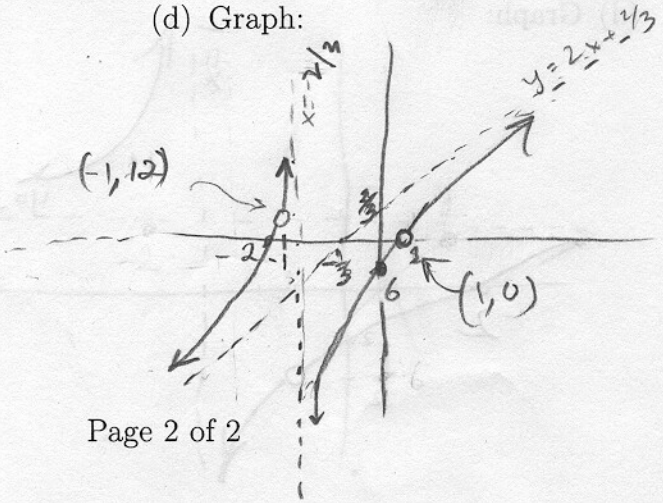
at -1 we get $\frac{6(4)(1)}{(-1)(-2)} = 12$; at 1 we get $\frac{6(0)(2)(3)}{(5)(2)} = 0$

(c) hoizontal/oblque asymptotes: (look at degree of n and m, divide if improper) $4>3$ so we divide

$$3x^3+2x^2-3x-2 \;\overline{)\; 6x^4+6x^3-18x^2-6x+12}$$
$$2x+\tfrac{2}{3}$$
$$-(6x^4+4x^3-6x^2-4x)$$
$$2x^3$$

So $y = 2x + \frac{2}{3}$

(d) Graph:



2. $\dfrac{2x^4+2x^3-6x^2-2x+4}{6x^2+5x} = \dfrac{2(x+2)(x-1)^2(x+1)}{x(6x+5)}$

1 | 2 2 -6 -2 4
2 4 -2 -4
1 | 2 4 -2 -4 0
2 6 4
-1 | 2 6 4 0
-2 -4
-2 | 2 4 0
4
2 0

$2x+4=0$
$2(x+2)=0$
$x=-2$

(a) zeros: (find when numerator is zero)

1 (with mult. 2)
-1
-2

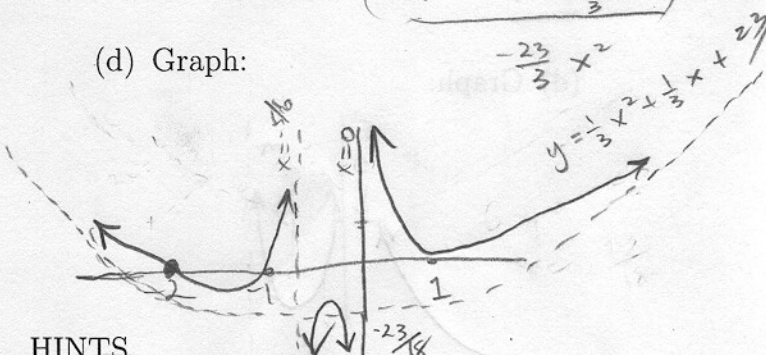
(b) vertical asymptotes: (is denominator zero?)

$x=0$
$x=-\frac{5}{6}$

(c) hoizontal/oblque asymptotes: (look at degree of n and m, divide if improper) $4>2$ so we divide;

$$6x^2+5 \;\overline{)\; 2x^4+2x^3-6x^2-2x+4}$$
$$y = \tfrac{1}{3}x^2+\tfrac{1}{3}x-\tfrac{23}{18}$$
$$-2x^4 \quad -\tfrac{5}{3}x^2$$
$$2x^3-\tfrac{23}{3}x^2$$
$$(-2x^3 \quad -\tfrac{5}{3}x)$$
$$-\tfrac{23}{3}x^2$$

(d) Graph:



HINTS

4a. $6x^4+6x^3-18x^2-6x+12 = 6(x-1)^2(x+1)(x+2)$

4c. $(3x+2)(x+1)(x-1) = 3x^3+2x^2-3x-2$

2a. $2x^4+2x^3-6x^2-2x+4 = (2x+4)(x+1)(x-1)^2$