Mat150_Chapter 3 Review Name:---------**KEY**----------
Spring 2010

Given the following rational function find the following:

1) $f(x) = \dfrac{x^2+2x}{x-1}$ $\quad x-1\neq 0$, $x\neq 1$

a) domain: $\mathbb{R}$; $x\neq 1$

b) Vertical Asymptote(s) $x=1$

c) End Behavior Asymptote: (Horizontal/Oblique/Other) EBM: $\frac{x^2}{x} \Rightarrow OA$

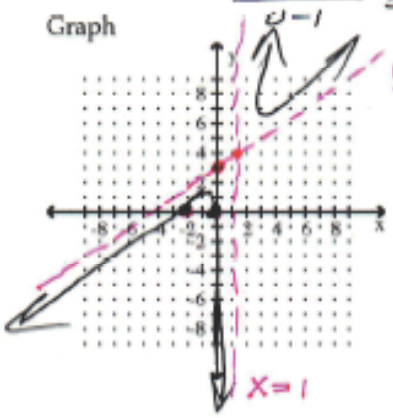
d) x- Intercept(s) $x^2+2x=0$, $x(x+2)=0$, $x=0$ $x=-2$, $(0,0)$ $(-2,0)$

e) y-Intercept: $\frac{0^2+2(0)}{0-1} = \frac{0}{-1} = 0$, $(0,0)$

$1\,|\,1\ +2\ \ 0$; $\downarrow\ \ 1\ \ 3$; $1\ \ 3\ \ 3$; $x+3$

OA: $y=x+3$

Graph



Solve the polynomial inequality.

2) $3x4 - 18x2 \leq 0$ $\neq 0$ open dots

$3x^4-18x^2=0$

$3x^2(x^2-6)=0$

0 mult 2 $\quad x=\pm\sqrt{6}$ mult 1

numberline: $+$ $-\sqrt{6}$ $-$ 0 $-$ $\sqrt{6}$ $+$

answer: $(-\sqrt{6},0)\cup(0,\sqrt{6})$ $\quad x=1$ Test $3(1)^4-18(1)^2<0$

Solve the rational inequality.

3) $\dfrac{(x-2)2}{x2-9} \geq 0$ $\neq 0$ open dots

$+$

$(x-2)^2=0$

$x-2=0$

$x=2$ mult 2

$x^2-9\neq 0$

$x\neq\pm 3$

always open dots

numberline: $+$ -3 $-$ 2 $-$ 3 $+$

$x=0$ test $\quad \frac{(0-2)^2}{0^2-9} = \frac{4}{-9} < 0$

$1\,|\,(-\infty,-3)\cup(3,\infty)$

List the potential rational zeros of the polynomial function. Do not find the zeros.

4) $f(x) = 6x^4 + 4x^3 - 2x^2 + 2$

$F = 6 \qquad B = 2$

$\frac{B}{F} = \frac{\pm 1, \pm 2}{\pm 1, \pm 2, \pm 3, \pm 6} = \pm 1, \pm 2, \pm \frac{1}{2}, \pm \frac{1}{3}, \pm \frac{2}{3}, \pm \frac{1}{6}$

Find all zeros of the function and write the polynomial as a product of linear factors.

5) $f(x) = 2x^4 + 3x^3 + 9x^2 + 12x + 4$

① List: $B = 4 \qquad F = 2$

$\frac{B}{F} = \frac{\pm 1, \pm 2, \pm 4}{\pm 1, \pm 2} = \pm 1, \pm 2, \pm 4, \pm \frac{1}{2}$

② narrow $-\frac{1}{2}, -1$ are zeros

$$-\tfrac{1}{2} \;\big|\; 2 \quad 3 \quad 9 \quad 12 \quad 4$$
$$\qquad\quad \downarrow \quad -1 \quad -1 \quad -4 \quad -4$$
$$-1 \;\big|\; 2 \quad 2 \quad 8 \quad 8 \quad \cancel{X}$$
$$\qquad\quad \downarrow \quad -2 \quad 0 \quad -8$$
$$\qquad\quad 2 \quad 0 \quad 8 \quad \cancel{X}$$

$2x^2 + 8$

$2(x^2 + 4)$

$x^2 + 4 = 0$

$x^2 = -4$

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

$x = \pm 2i$

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

Information is given about a polynomial f(x) whose coefficients are real numbers. Find the remaining zeros of f.

6) Degree 6; zeros: -2, $2+i$, $-3-i$, 0.

$2-i \qquad -3+i$

$f(x) = a(x+2)(x-(2+i))(x-(2-i))(x-(-3-i))(x-(-3+i)) \cdot x$

Form a polynomial whose zeros and degree are given.

7) Zeros: 3, multiplicity 2; -3, multiplicity 2; degree 4

$3, 3, -3, -3$

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

For the given polynomial,

a. list each real zero and its multiplicity.

b. Determine whether the graph crosses or touches the x-axis at each x -intercept and the shape of the graph at that intercept.

c. What is the power funtion and the end behavior of the function.

$-\frac{1}{5}$ -9

8) $f(x) = \left[x + \frac{1}{5}\right]^2 (x+9)3$

zero	multiplicity	Touch/cross	Shape
$-\frac{1}{5}$	2	Touch	parabola
-9	3	cross	"S"

Power function: $(x+\frac{1}{5})^2 (x+9)^3$

$x^2 \cdot x^3 = x^5$

End Behavior: odd degree $a > 0$

Bottom/Top

Solve.

9) The price of electric guitars has varied considerably in recent years. The data in the table relates the price P, i dollars, to time t, in years, where t = 1 corresponds to 1988. Fit a cubic function to the data and use it to predict the price of an electric guitar in 1997.

Year, t	Average price, p, of an electric guitar
1988 (t = 1)	$618.20
1989 (t = 2)	783.20
1990 (t = 3)	674.30
1991 (t = 4)	721.60
1992 (t = 5)	825.00
1993 (t = 6)	891.00
1994 (t = 7)	852.50
1995 (t = 8)	819.50
1996 (t = 9)	783.20

$y = -1.5x^3 + 16.4x^2 - 12.03x + 653.06$

$x = 10 \quad y = 672.76$

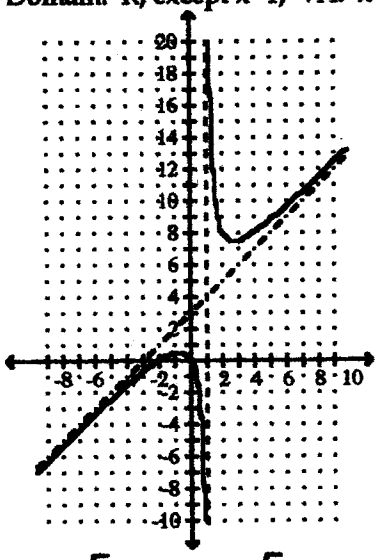
b) Find the Average rate of change between 1992 and 1994. (slope of the line)

(5, 825) (7, 852.50)

$$\frac{852.50 - 825.00}{7 - 5} = \frac{27.5}{2} = \$13.75 \text{ per year}$$

Answer Key
Testname: 150_CH3_REV_ Spring 2009

1) Domain: R; except x=1; VA: x=1 ; OA: y=x+2 ; x-intercepts: (0,0), (-2,0) ; y-intercept: (0,0)



2) ~~$x < -\sqrt{6}$ or $0 < x < \sqrt{6}$~~ $(-\sqrt{6}, 0) \cup (0, \sqrt{6})$

3) $(-\infty, -3)$ or $(3, \infty)$

4) $\pm\frac{1}{6}, \pm\frac{1}{3}, \pm\frac{1}{2}, \pm\frac{2}{3}, \pm 1, \pm 2$

5) $f(x) = (2x + 1)(x + 1)(x + 2i)(x - 2i)$

6) $2 - i, -3 + i$

7) $f(x) = x^4 - 18x^2 + 81$

8) $-1/5$, Mult. 2, Touch, parabola
-9, Mult 3, Cross, "S"
Power function: x^5
end behavior: Bottom/Top

9) $672.76
answers may vary based on rounding.
should be in the $670 range.

b) $13.75 per year.