MATH 1065 — Chapter 3 Review

3.1 (25) $G(x) = 2(x-1)^2(x^2+1) \Rightarrow 2x^4 + \dots + 2$

YES, Degree = 4.

(47) Zeros: -1, 3 $(m=2)$

Degree = 3

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

OR $(x+1)(x^2-6x+9) = x^3-6x^2+9x+x^2-6x+9$

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

(57) $f(x) = 3(x^2+8)(x^2+9)^2$

Degree = 6

Leading Coefficient POSITIVE

$x^2+8=0$

$x^2 = -8$

$x = \pm\sqrt{-8} = \pm 2i\sqrt{2}$

$x^2+9=9$

$x^2 = -9$

$x = \pm 3i$

a) Zeros: $\pm 2i\sqrt{2}$ $(m=2)$, $3i$, $-3i$ $(m=2)$

b) NO x-Intercepts

c) " "

d) Max Turning Points = 5

e) ↑ ↑

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

Similar Power Function

$g(x) = 3(x^2)(x^2)^2$

$g(x) = 3x^6$

3.3 (53) $(0,1)$; $(1,0)$ $(3,0)$; $x=-1$, $x=2$; $y=1$

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

$f(0)=1 \Rightarrow$ 3a

$$1 = \frac{(0-1)(0-3)(0^2+a)}{(0+1)^2(0-2)^2}$$

4

$\frac{3}{4}a = 1$

$a = 4/3$

$$f(x) = \frac{(x-1)(x-3)(x^2+4/3)}{(x+1)^2(x-2)^2}$$

3.3 (51) $(0,0)$; $(0,0)$; $x=-2$; $x=2$; $y=1$

SAME DEGREE

$f(x) = \dfrac{x^2}{(x+2)(x-2)}$

$f(x) = \dfrac{x^2}{x^2-4}$

(66) y-INT Whatever ; $(2,0)$ $(-1,0)$ ↑ bouncer ; $x=-5$; $x=6$; $y=3$

$$f(x) = \frac{3(x-2)(x+1)^2}{(x+5)^2(x-6)}$$

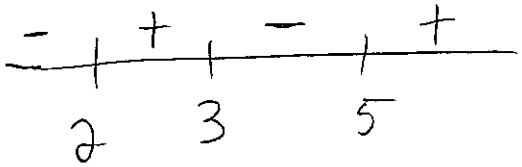
3.4 (43) $\dfrac{1}{x-2} < \dfrac{2}{3x-9}$

$$\frac{1}{x-2} - \frac{2}{3x-9} < 0$$

$$\frac{3(x-3)}{3(x-3)} - \frac{(x-2)}{3x-9} < 0$$

$$\frac{x-5}{3x-9} < 0$$

$$\frac{x-5}{3(x-2)(x-3)} < 0$$



$(-\infty, 2) \cup (3, 5)$

(71) $C = 80x + 5000$ ↑ Cost

$\overline{C} = \dfrac{80x+5000}{x}$ ↑ Average Cost

Find $\overline{C} \leq 100$

$$\frac{80x+5000}{x} \leq 100$$

$80x + 5000 \leq 100x$

$5000 \leq 20x$

$250 \leq x$

250 or more bicycles

3.R (15) $f(x) = -2x^3 + 4x^2$

$-2x^2(x-2)$

NEG
ODD

x-INT: (0,0), (2,0)

y-INT: (0,0)

Zeros: $x=0$ $(m=2)$, $x=2$ $(m=1)$

Max Turning Points: 2

Near each x-Int

Near $x=0$ $f(x) \approx 4x^2$

Near $x=2$ $f(x) \approx -8x+16$

$-8(x-2)$

19-22 DOMAIN? Asymptotes

(19) $R(x) = \frac{x+2}{x^2-9}$

$(x+3)(x-3)$

D: $x \neq \pm 3$

$x=-3$ & $x=3$

$y=0$

(20) $R(x) = \frac{x^2+4}{x-2}$

$x+2$

$x-2 \overline{)\, x^2+0x+4}$

$-(x^2-2x)$

$2x+4$

D: $x \neq 2$

$x=2$

oblique Asymptote $y=x+2$

(21) $R(x) = \frac{x^2+3x+2}{(x+2)^2} = \frac{x^2+3x+2}{x^2+4x+4} = \frac{(x+2)(x+1)}{(x+2)^2} = \frac{x+1}{x+2}$

D: $x \neq -2$

$x=-2$

$y=1$

(22) $R(x) = \frac{x^3}{x^3-1} = \frac{x^3}{(x-1)(x^2+x+1)}$

$x \neq \frac{-1 \pm \sqrt{1-4(1)(1)}}{2(1)}$

D: $x \neq 1$; $\frac{-1 \pm i\sqrt{3}}{2}$

$x=1$

$y=1$

(27) $R(x) = \frac{x^2+x-6}{x^2-x-6} = \frac{(x+3)(x-2)}{(x-3)(x+2)}$

y-INT: (0,1)

x-INT: (-3,0), (2,0)

Vert Asymt: $x=3$, $x=-2$

Horiz Asympt: $y=1$

(33) $G(x) = \frac{x^2-4}{x^2-x-2} = \frac{(x+2)(x-2)}{(x-2)(x+1)} = \frac{x+2}{x+1}$

y-INT: (0,2)

x-INT: (-2,0)

Vert Asympt: $x=-1$

Horiz Asympt: $y=1$

HOLE at $(2, \frac{4}{3})$

(36) $x^3+4x^2 \geq x+4$

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

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

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

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

− + − +

-4 -1 1

$[-4,-1] \cup [1,\infty)$

(41) $\frac{(x-2)(x-1)}{x-3} \geq 0$

− + − +

1 2 3

$[1,2] \cup (3,\infty)$