Pre-Calculus - Unit 6

Name: Key

Polynomials and Rationals

6.1 Graphing Polynomials

For each of the following functions:

a. Use the Leading Coefficient Test to determine the polynomial function's end behavior.
b. Find the x-intercepts by setting the function =0 and factoring.
c. Determine each solution's multiplicity and state if it touches the x-axis and turns around or crosses the x-axis.
d. Determine the y-intercept of each polynomial function.
e. Sketch the graph of the polynomial function.

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

a. End Behavior

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

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

b. x-intercepts

$-x^2(x^2-4)=0$ $\quad x=0$

$-x^2(x+2)(x-2)=0$ $\quad x=2$, $x=-2$

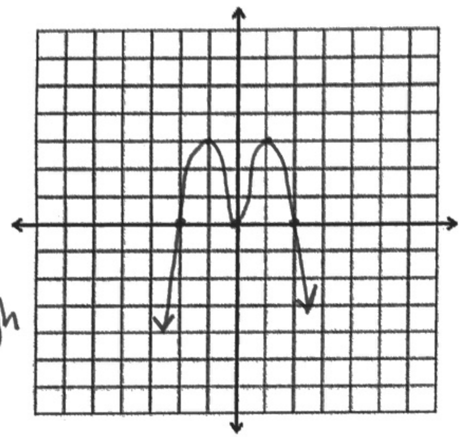
c. Multiplicity

$x=0$ m2 bounces

$x=2$, $x=-2$ m1 passes through

d. Y-intercept

(0,0)



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

a. End Behavior

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

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

b. x-intercepts

$x^2(x+2)-1(x+2)$ $\quad (x+1)(x-1)(x+2)=0$

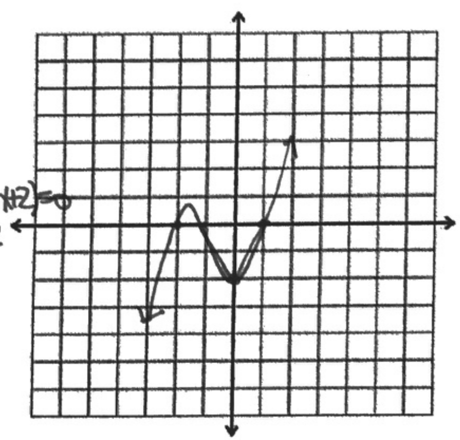
$(x^2-1)(x+2)=0$ $\quad x=1,-1,-2$

c. Multiplicity

all have m1 - so all pass through

d. Y-intercept

(0,-2)



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

a. End Behavior

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

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

b. x-intercepts

$x^2(x+1)-4(x+1)$

$(x^2-4)(x+1)$

$(x+2)(x-2)(x+1)$

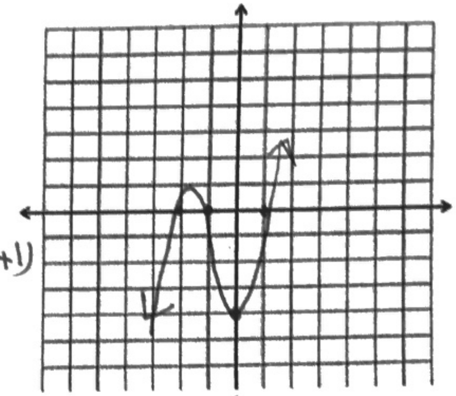
$\boxed{x=-1,-2,2}$

c. Multiplicity

all m1 - all pass through

d. Y-intercept

(0,-4)



4. $f(x) = x^4 - 6x^3 + 9x^2$

a. End Behavior

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

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

b. x-intercepts

$x^2(x^2-6x+9)$ | $x^2(x-3)^2$

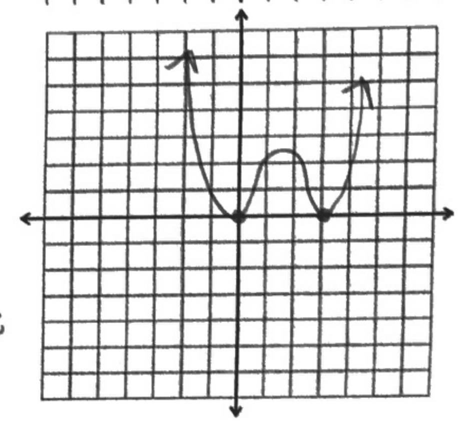
$x^2(x-3)(x-3)$ | $x=0,3$

c. Multiplicity

$x=0$, $x=3$ m2 both bounce

d. Y-intercept

(0,0)



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

a. End Behavior

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

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

b. x-intercepts

$x^2(x^2-2x+1)$ | $x^2(x-1)^2$

$x^2(x-1)(x-1)$ | $x=0,1$

c. Multiplicity

m2 for both; both bounce

d. Y-intercept

(0,0)