HAPC
Unit 1
1.6 Worksheet: Polynomial Functions and End Behavior   Hour:_____ Date:_____

Name:_____

Directions: For each of the following functions, write limit statements to describe the end behavior.

1)

$f(x)$

$\lim\limits_{x \to -\infty} f(x) = \infty$

$\lim\limits_{x \to \infty} f(x) = \infty$

2)

$m(x)$

$\lim\limits_{x \to -\infty} m(x) = \infty$

$\lim\limits_{x \to \infty} m(x) = -\infty$

3)

$h(x)$

$\lim\limits_{x \to -\infty} h(x) = -\infty$

$\lim\limits_{x \to \infty} h(x) = \infty$

4)

$k(x)$

$\lim\limits_{x \to -\infty} k(x) = -\infty$

$\lim\limits_{x \to \infty} k(x) = \infty$

5)

$p(x)$

$\lim\limits_{x \to -\infty} p(x) = \infty$

$\lim\limits_{x \to \infty} p(x) = -\infty$

6)
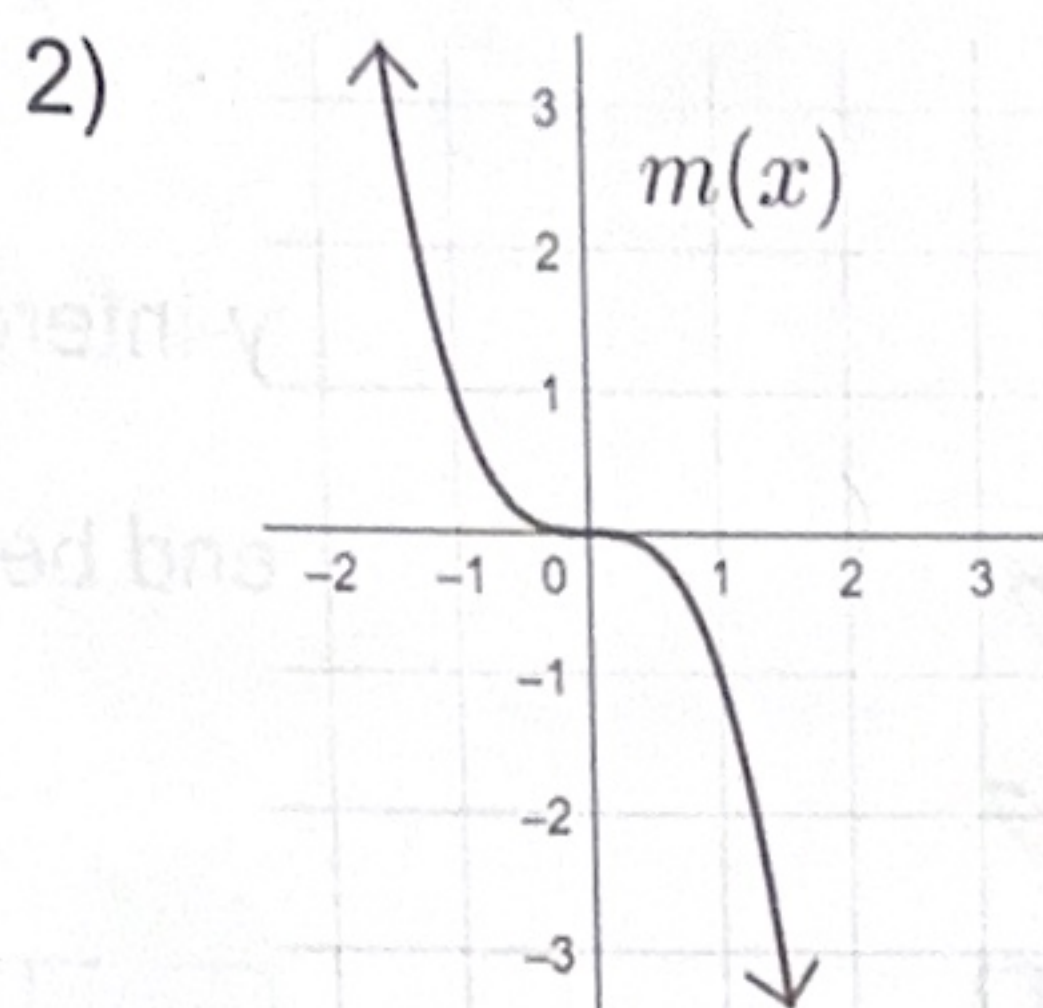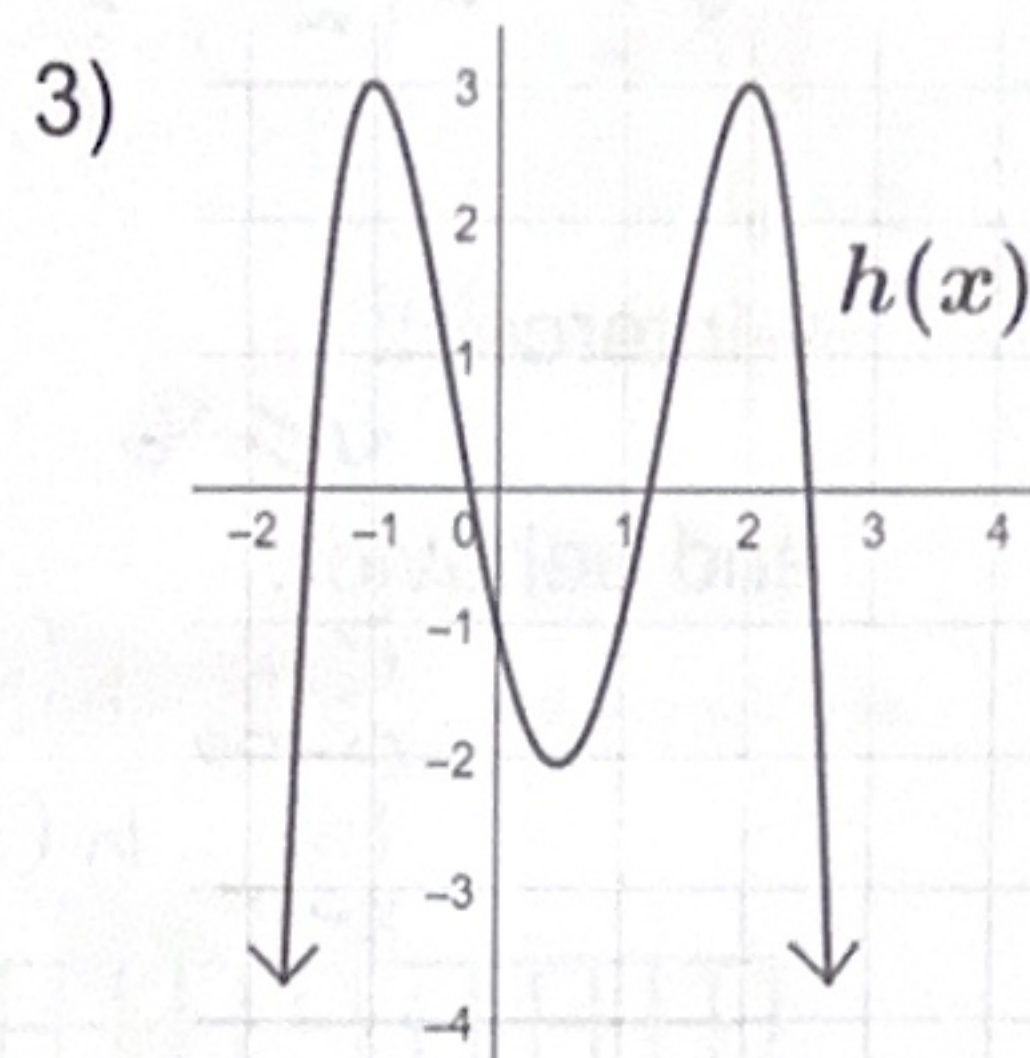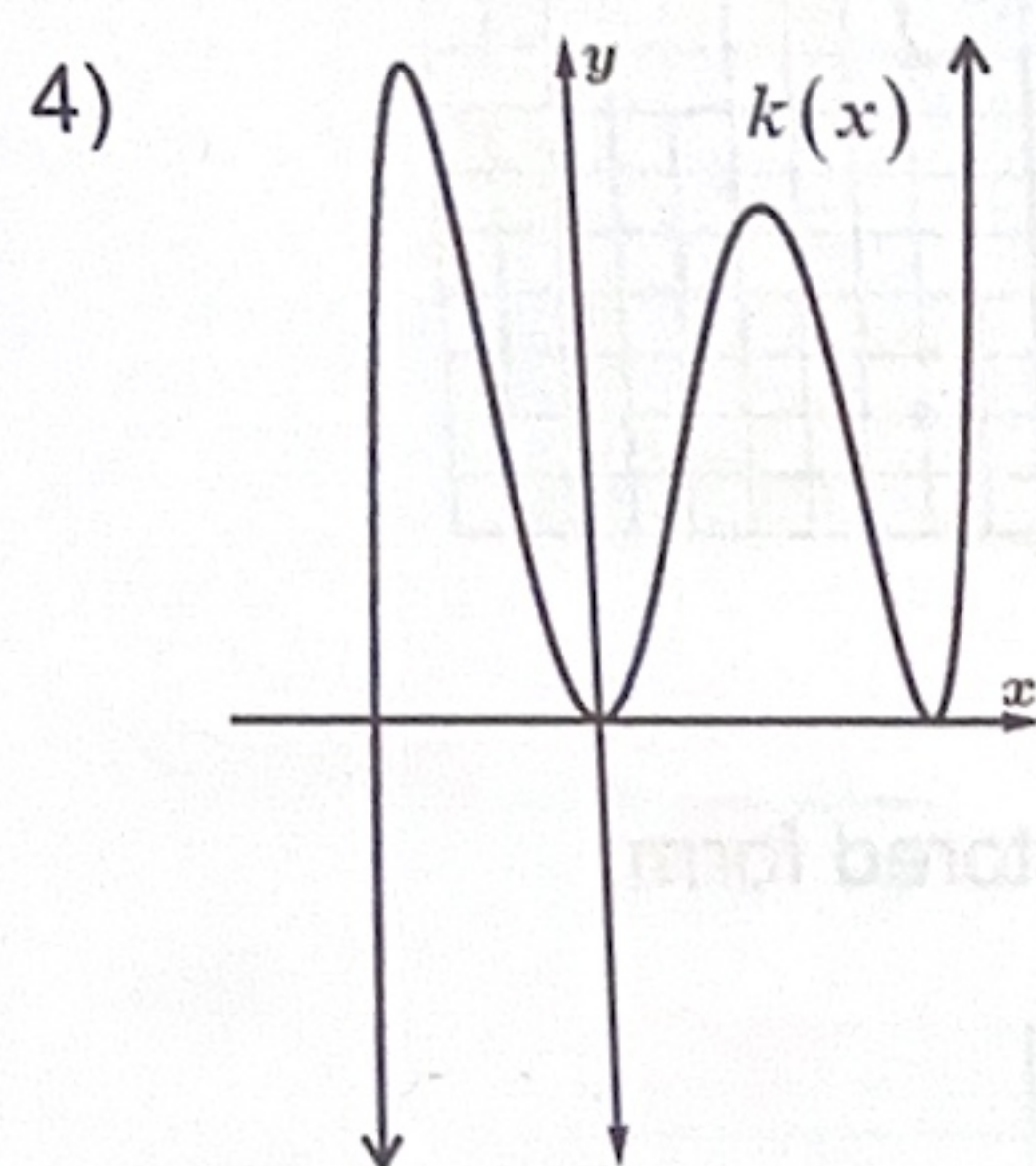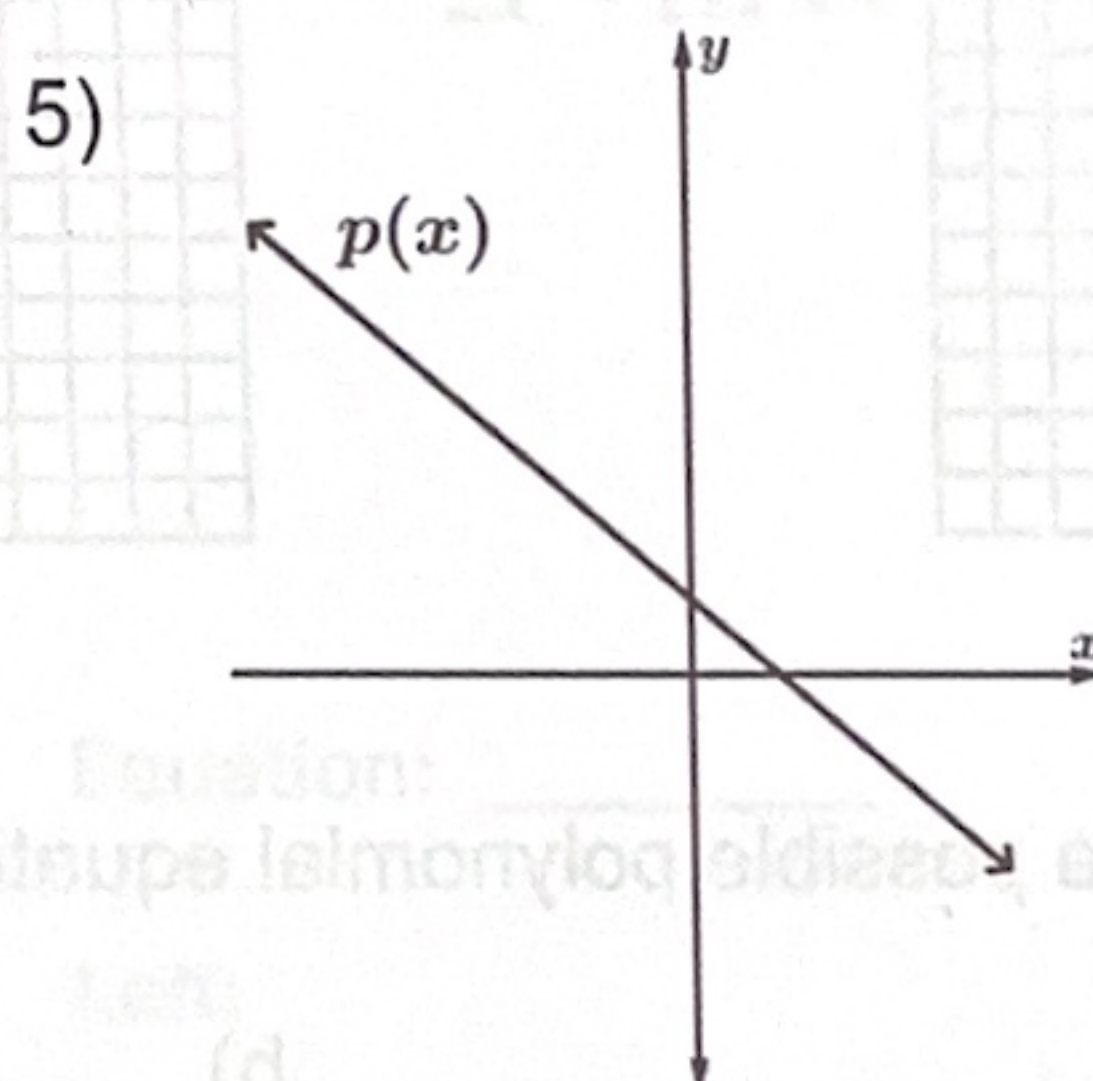
$g(x)$
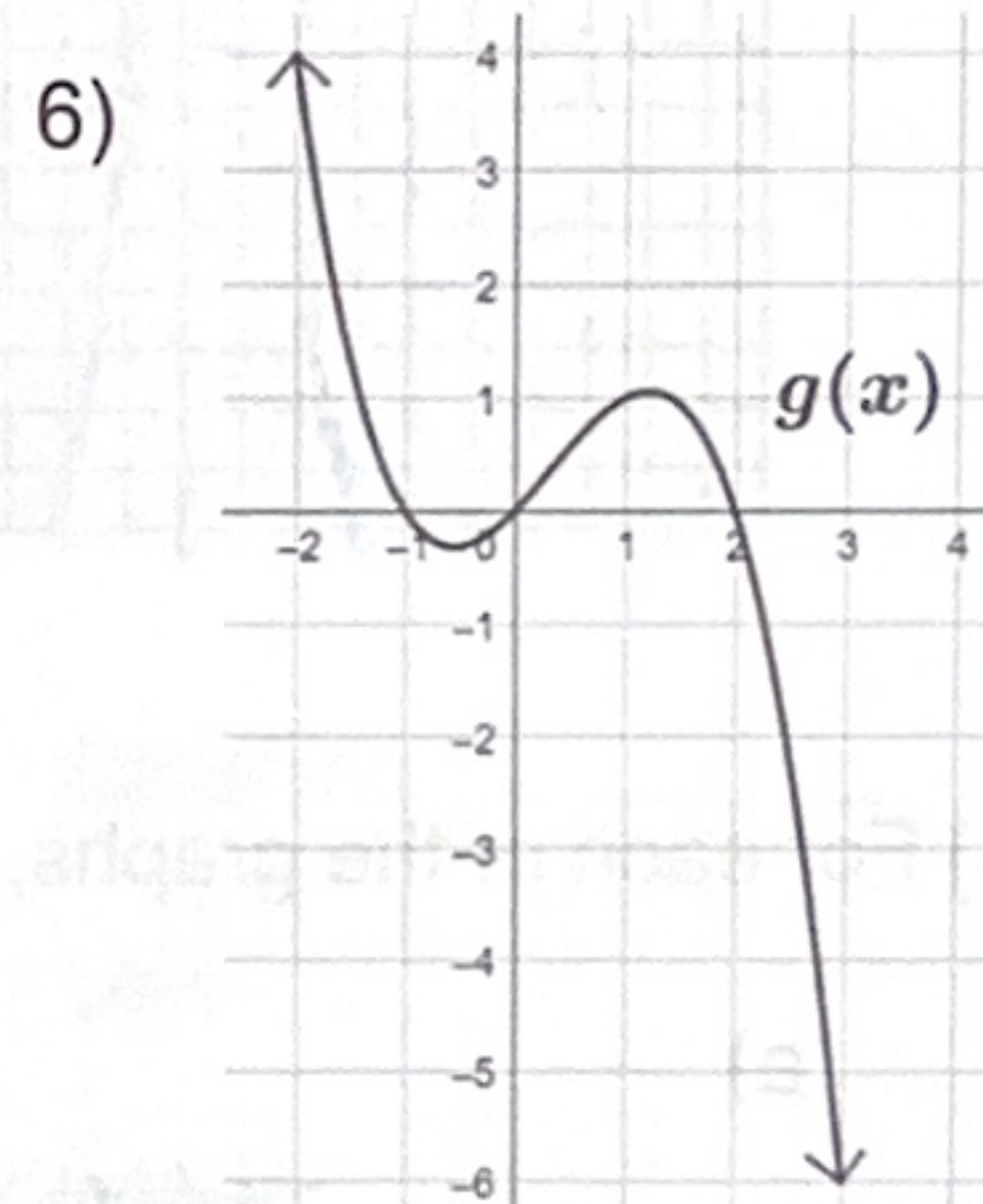
$\lim\limits_{x \to -\infty} g(x) = \infty$

$\lim\limits_{x \to \infty} g(x) = -\infty$

7) $f(x) = -4x^3$

$\lim\limits_{x \to -\infty} f(x) = \infty$

$\lim\limits_{x \to \infty} f(x) = -\infty$

8) $y = 3(x-1)^5$

$\lim\limits_{x \to -\infty} y = -\infty$

$\lim\limits_{x \to \infty} y = \infty$

9) $h(x) = 8 - 3x^4$

$\lim\limits_{x \to -\infty} h(x) = -\infty$

$\lim\limits_{x \to \infty} h(x) = -\infty$

10) $g(x) = 3x^6$

$\lim\limits_{x \to -\infty} g(x) = \infty$

$\lim\limits_{x \to \infty} g(x) = \infty$

11) $m(x) = 2x(x-1)(x+6)$

$\lim\limits_{x \to -\infty} m(x) = \infty$

$\lim\limits_{x \to \infty} m(x) = \infty$

12) $p(x) = -2x(x-3)^2$

$\lim\limits_{x \to -\infty} p(x) = \infty$

$\lim\limits_{x \to \infty} p(x) = -\infty$

13) For each of the polynomials, find all zeros & state the multiplicity for each zero, find the y intercept, and describe the end behavior. Then graph without a calculator.
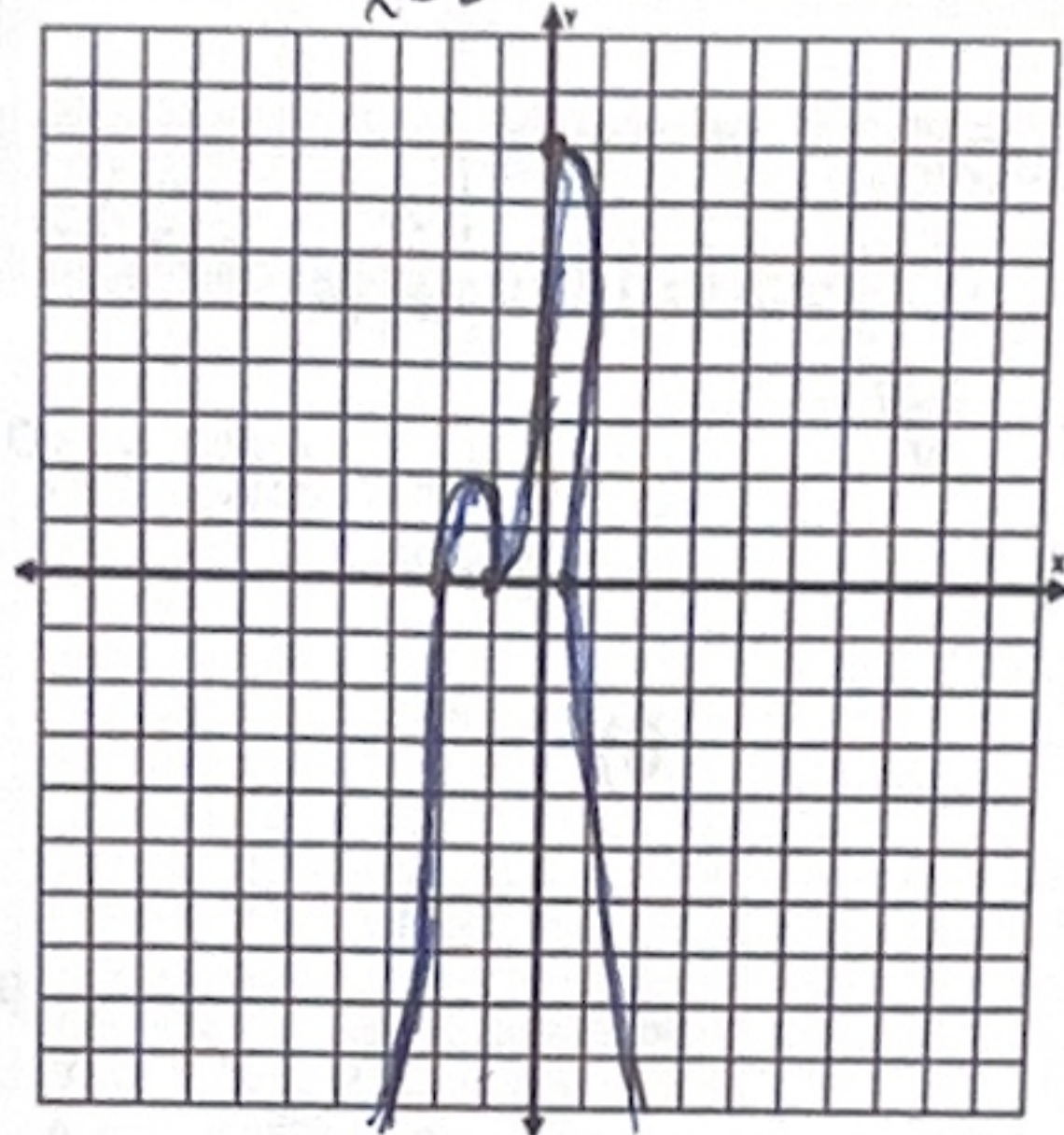
a) $h(x) = -4(x + 1)^2(3x - 1)(x + 2)$ $-1m^2 \quad \frac{1}{3} \quad -2$

$-4, 1, -1, 2$

zeros with multiplicity:

$x = -1m^2, \frac{1}{3}, -2$

y-intercept:

$y = 8$

end behavior:

$\lim\limits_{x \to -\infty} h(x) = -\infty$

$\lim\limits_{x \to \infty} h(x) = -\infty$

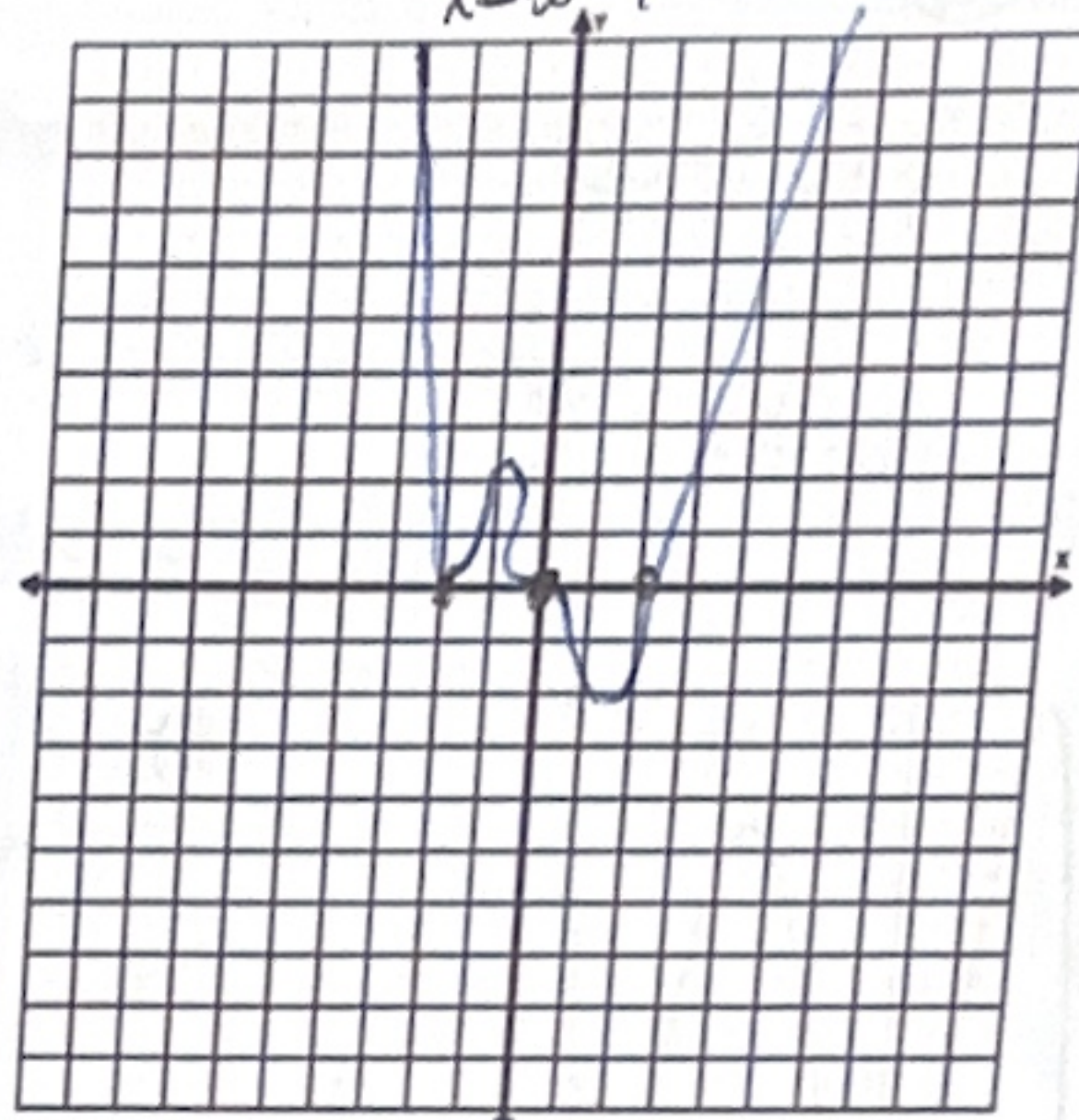b) $y = x^3(x + 2)(x^2 - 4)$ $0 \cdot 2 \cdot -4$

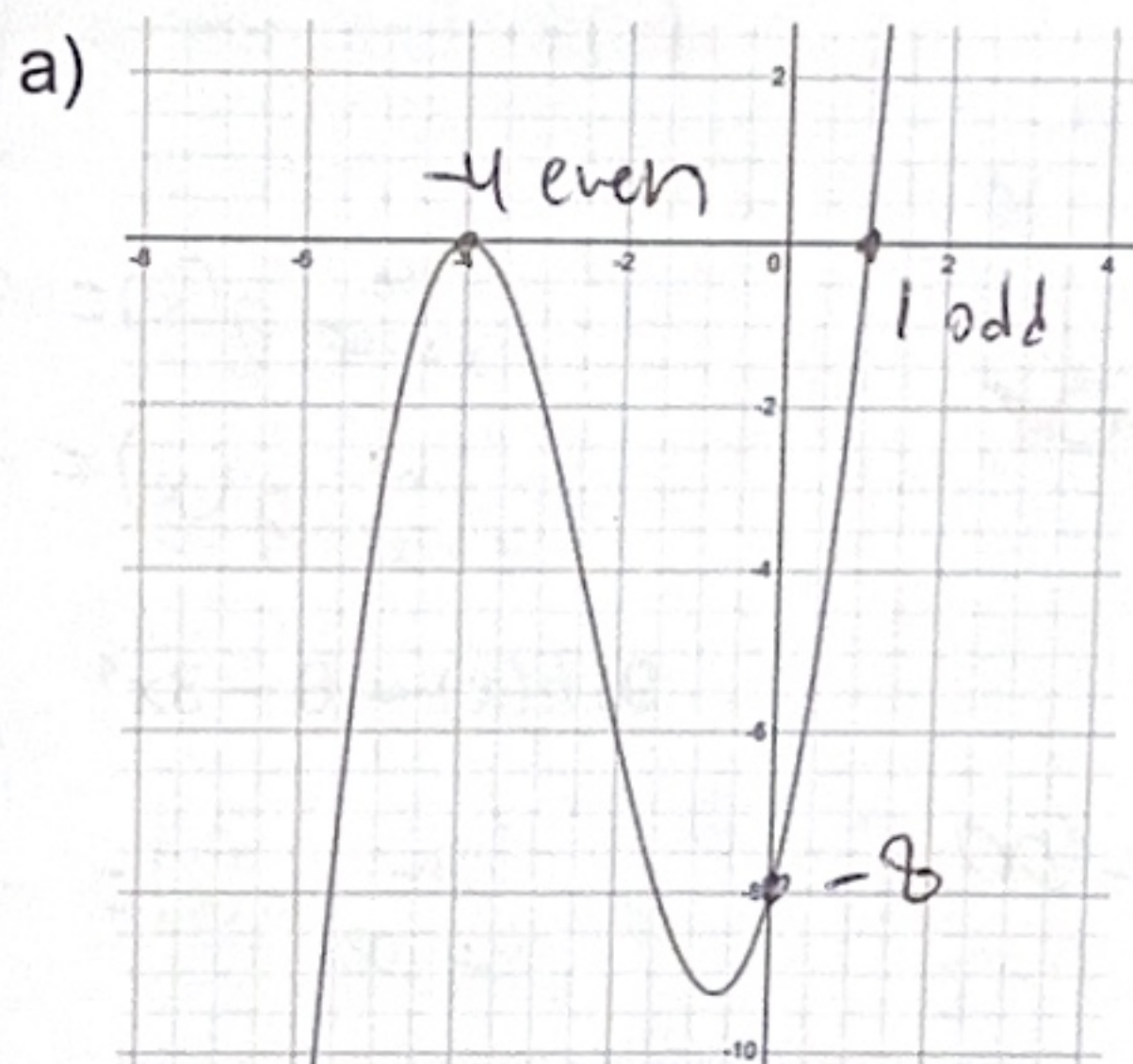zeros with multiplicity:

$x = 0 m3, -2 m2, 2$

y-intercept: $y = 0$

end behavior:

$\lim\limits_{x \to -\infty} y = \infty$

$\lim\limits_{x \to \infty} y = \infty$

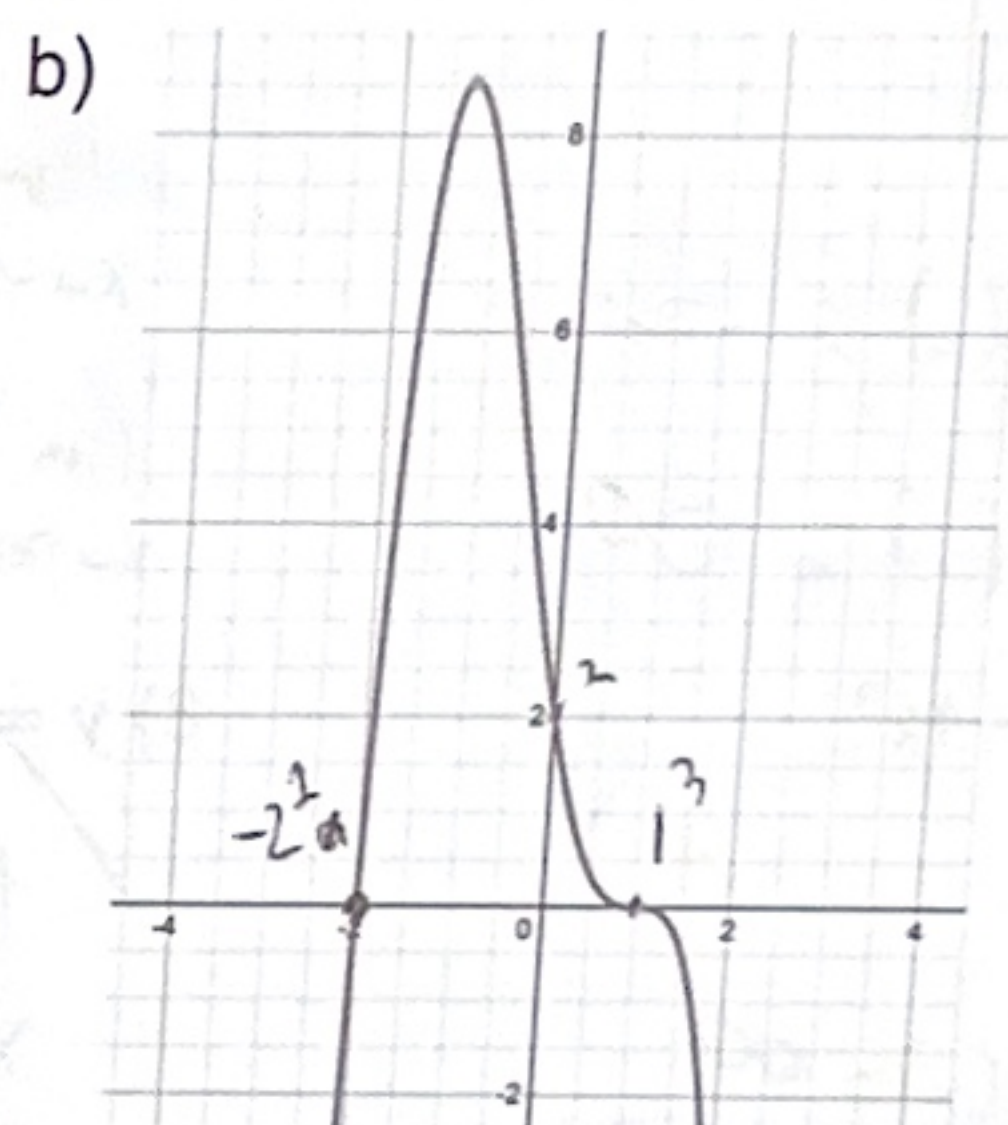14) For each of the graphs, write a possible polynomial equation in factored form.

a)

4 even

1 odd

-8

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

$-8 = a \cdot 16 \cdot -1$

$-16a = -8$

$a = \frac{1}{2}$

$\left[f(x) = \frac{1}{2}(x+4)^2(x-1) \right]$

b)

$-2a$ 1^3

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

$2 = a \cdot 2 \cdot -1$

-1

$\left[f(x) = -1(x+2)(x-1)^3 \right]$