Name Key IM3H

1. Identify the following functions.

X	Y
1	8
2	11
3	14
4	17

+3, +3, +3

linear

X	Y
1	8
2	15
3	34
4	71

+7, +19, +37; +12, +18; +6

cubic

X	Y
1	8
2	24
3	72
4	216

+16, +48, +144; ·3, ·3, ·3

exponential

2. Find the recursive and explicit equation given the following table.

X 0	Y 0
1	4
2	10
3	18
4	28

+2, +4, +6, +8, +10; +2, +2, +2, +2

quadratic

$f(x) = x^2 + bx + 0$

$4 = 1^2 + b(1)$

$b = 3$

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

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

$f(1) = 4$

3. A) Factor $3x^3 - 81$

$3(x^3 - 27)$

B) State how many real roots, then find all roots.

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

1 real root: $x = 3$

2 imaginary: $x = \frac{-3 \pm \sqrt{3^2 - 4(1)(9)}}{2(1)} = \frac{-3 \pm \sqrt{-27}}{2} = \frac{-3 \pm 3i\sqrt{3}}{2}$

Do not worry about this yet!

4. Fill in the blank for all of the following.

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

$x \to \infty \; f(x) \to$ -2

$x \to -\infty \; f(x) \to$ ∞

b. $f(x) = 3 - x^7$

$x \to \infty \; f(x) \to$ -∞

$x \to -\infty \; f(x) \to$ ∞

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

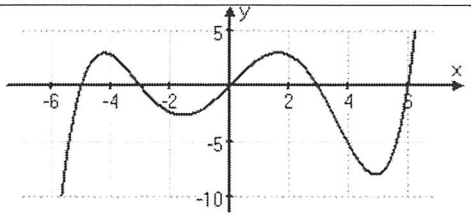
$x \to \infty \; f(x) \to$ -∞

$x \to -\infty \; f(x) \to$ -∞

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

$x \to \infty \; f(x) \to$ ∞

$x \to -\infty \; f(x) \to$ 1

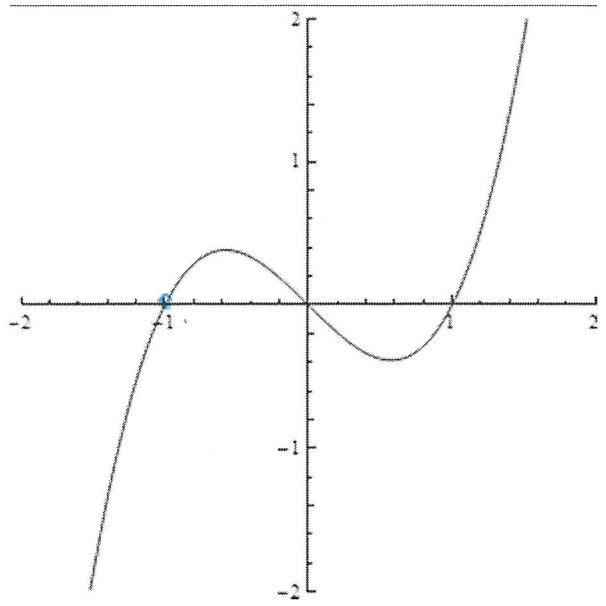


e.

$x \to \infty \; f(x) \to$ ∞

$x \to -\infty \; f(x) \to$ -∞

5. Identify all **zeros and factors.**



zeros
$x = -1, 0, 1$

Factors

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

$(x+0)$

6. Given $f(x) = x^3 + 2x^2 - 3x + 5$ and $g(x) = -2x^2 + 6x - 3$.

a. Find $f(x) - g(x)$

$x^3 + 2x^2 - 3x + 5 - (-2x^2 + 6x - 3)$ (+ − +)

$x^3 + 4x^2 - 9x + 8$

b. Find $f(x) \cdot g(x)$

multiply

$(x^3 + 2x^2 - 3x + 5)(-2x^2 + 6x - 3)$

$-2x^5 + 6x^4 - 3x^3 - 4x^4 + 12x^3 - 6x^2 + 6x^3 - 18x^2 + 9x$

$-10x^2 + 30x - 15$

$= -2x^5 + 2x^4 + 15x^3 - 34x^2 + 39x - 15$

7. Prove that x = 2 is a root of $x^3 - 6x^2 - 4x + 24$.

$x = 2$ is a root if it makes the expression equal to zero when evaluated.

$(2)^3 - 6(2)^2 - 4(2) + 24$

$8 - 24 - 8 + 24$

$x = 2$ is a root