IB Math SL **Differentiating Polynomials**

Unit 2 – Day 3 Notes

1. **A Bit of History:**

Calculus is a Latin word meaning “pebble.”

1. **Investigation:**

Use the definition of a derivative from last class$\left(\lim\_{h\to 0}\frac{f\left(x+h\right)-f(x)}{h}\right)$ to find the derivatives of:

1. f(x) = x2
2. f(x) = 4x2
3. f(x) = 2x3

Conjecture:

Rule for Differentiating a Power Function: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. **Differentiating Polynomials:**

Polynomials are merely sums of power functions.

General Rule for Differentiating a Polynomial: If f(x) = axn + bxm, then f’(x) = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Examples:**  Differentiate the following:

1. f(x) = 3x5 + 7x2 + 1
2. 
3. 

Remember, is a notation, not a fraction. It stands for , or change in y over change in x – SLOPE. Use this notation when the given problem uses a y instead of f(x).

**Examples:** Differentiate the following:

4. y = 4x3 – 5x2 + 3x + 2

5. y = (3x + 1)(x2 + 2)

1. **Tangents and Normal Lines**

The *NORMAL* line means the line is ⊥ to the tangent line.

**Ex 6:** The line y = 2x – 10 is tangent to the graph of y = x2 + 4x – 9 at the point (a, b). Find the values of a and b.

**Ex 7:** g(x) = mx + c is the equation of the tangent to the curve f(x) = 2x2 – 7x + 3 at the point (5, 18). Find m and c.

**Ex 8:** Find the equation of the normal line to the curve f(x) = x2 + 1 at the point (1, 2).

**Ex 9:** The line y = x + 4 is tangent to the curve with equation y = x2 + k. Find the value of k.