IB Math SL **Differentiation of Other Functions**

Unit 2 – Day 6 Notes

1. **Derivative of Trigonometric Functions:**

**Ex 1:** Graph f(x) = sin x. Use your GDC and the “Draw” feature to fill in the table with the slope of the tangent line at the given values of x:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| x | 0 | π/6 | π/4 | π/3 | π/2 | 2π/3 | 3π/4 |
| m |  |  |  |  |  |  |  |

Now plot the above table in STAT and look at the points.

Conclusion: For f(x) = sin x, f’(x) = = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Ex 2:** Repeat the process with f(x) = cos x.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| x | 0 | π/6 | π/4 | π/3 | π/2 | 2π/3 | 3π/4 |
| m |  |  |  |  |  |  |  |

Now plot the above table in STAT and look at the points.

Conclusion: For f(x) = cos x, f’(x) = = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. **Chain Rule:**

The chain rule helps us differentiate more complicated functions.

Here is how it works:

1. Functions raised to a power: f(x) = (x2 – 3)4

We are going to find the derivative of the mother function **⋅** the derivative of what’s “inside” the function.

f(x) = 4 So f’(x) = 4 3 d

Your other option here would be to multiply f(x) all out to be in standard form…

1. Natural log problems: f(x) = ln(2x3 – x)

f(x) = ln So f’(x) = 1/ d =

1. Exponential problems: y = e2x - 7

y = e So dy/dx = e d =

1. Sine problems: y = 2sin (3x2)

y = 2sin So dy/dx = 2cos d =

1. Cosine problems: f(x) = cos (ln 2x2)

f(x) = cos So f’(x) = -sin d =

**Examples:** Differentiate the following:

1. y = (2x2 + 3)5 2. f(x) = e2x

3. y = cos 5x 4. f(x) = ln sin x

5. f(x) = ln (3 – ex) 6. y = cos 4x2

7. g(x) = (4x3 – 2x)3 8. h(x) = cos2x

**Ex:** Differentiate the following mixed examples (You may have to use chain rule AS WELL AS product/quotient rules!):

a) y = (3x – 1)(x + 4)3 b) 

c)  d) y = x3 ln x

e) 