

## MATH34B REVIEW AND INTRODUCTION

### Differentiation rules:

1. Power rule

$$[x^n]' = nx^{n-1}$$

2. Product rule

$$[f(x)g(x)]' = f'(x)g(x) + f(x)g'(x)$$

3. Exponential rule

$$[e^x]' = e^x$$

4. Logarithm rule

$$[\ln x]' = \frac{1}{x}$$

### New rules:

5. Derivatives of trig functions

$$[\sin x]' = \cos x$$

$$[\cos x]' = -\sin x$$

$$[\tan x]' = \sec^2 x$$

6. Chain rule

$$[f(g(x))]' = f'(g(x))g'(x)$$

**Practice:** Find the derivative of the following functions.

1.  $f(x) = (x^2 + 2x - 1)^{10}$

2.  $f(x) = e^{4x} + e^{x^2}$

3.  $f(x) = \ln(\sin x)$

4.  $f(x) = \sqrt{2x+1} \cdot (e^x + 1)^3$

5.  $f(x) = [x^5 \ln(\cos x)]^4$

**Introduction to Integration:**

Motivation: (Signed) area under the graph

**Practice:**

1. Find the following integrals.

a)  $\int_4^{10} 3dx =$

b)  $\int_0^2 xdx =$

c)  $\int_{-1}^1 xdx =$

d)  $\int_{-2}^2 \sqrt{4-x^2}dx =$

2. Let  $y = f(x)$  be the function below.

Find the following integrals.

a)  $\int_{-3}^{-1} f(x)dx =$

b)  $\int_{-1}^1 f(x)dx =$

c)  $\int_1^3 f(x)dx =$

d)  $\int_{-3}^3 f(x)dx =$