

## Formulas to memorize

### Derivatives

1.  $\frac{d(c)}{dx} = 0$ ,  $c$  is a constant.

2.  $\frac{d(x^n)}{dx} = nx^{n-1}$

3.  $\frac{d(e^x)}{dx} = e^x$

4.  $\frac{d(\ln x)}{dx} = \frac{1}{x}$

5.  $\frac{d(\sin x)}{dx} = \cos x$

6.  $\frac{d(\cos x)}{dx} = -\sin x$

7.  $\frac{d(\tan x)}{dx} = \sec^2 x$

8. **Addition/Subtraction Rule**

$$\frac{d(f(x) \pm g(x))}{dx} = \frac{d(f(x))}{dx} \pm \frac{d(g(x))}{dx} \text{ OR } (f \pm g)' = f' \pm g'$$

9. **Product Rule**

$$\frac{d(f(x) \cdot g(x))}{dx} = f(x) \cdot \frac{d(g(x))}{dx} + g(x) \cdot \frac{d(f(x))}{dx} \text{ OR } (f \cdot g)' = f \cdot g' + g \cdot f'$$

10. **Quotient Rule**

$$\frac{d\left(\frac{f(x)}{g(x)}\right)}{dx} = \frac{g(x) \frac{d(f(x))}{dx} - f(x) \frac{d(g(x))}{dx}}{g(x)^2} \text{ OR } \left(\frac{f}{g}\right)' = \frac{g \cdot f' - f \cdot g'}{g^2}$$

11. **Chain Rule (Very Important)**

$$\frac{d(f(g(x)))}{dx} = f'(g(x)) \cdot \frac{d(g(x))}{dx}$$

Check these videos (1, 2) for some refresher on chain rule.

### Integrals ( $C$ is the constant of integration)

1.  $\int dx = x + C$

2.  $\int x^n dx = \frac{x^{n+1}}{n+1} + C$  for  $n \neq -1$

3.  $\int \frac{1}{x} dx = \ln|x| + C$

4.  $\int e^x dx = e^x + C$

5.  $\int \sin x dx = -\cos x + C$

6.  $\int \cos x dx = \sin x + C$

7.  $\int \sec^2 x dx = \tan x + C$

8.  $\int \frac{1}{1+x^2} dx = \tan^{-1} x + C$