

# MATH 2554 : 3.4-3.6 Review Sheet

## Some Problems I recommend

- Section 3.1 : 17, **32**
- Section 3.2 : 20, **25, 28**, 29a
- Section 3.3 : 12, 13, **14**, 16, 25, 26, 30, 34, 45, 64, 66
- Section 3.4 : 19, 22, 28, **29, 40**, 45, **61**, 76, 79, **81**
- Section 3.5 : **13**, 16, **19**, 28, **29**, 33, 45, 50
- Section 3.6 : **21, 23, 28**

Especially important ones in **bold**

## Key Concepts

### Basic derivative Rules :

1.  $\frac{d}{dx}c = 0$
2.  $\frac{d}{dx}f(x) + g(x) = f'(x) + g'(x)$
3.  $\frac{d}{dx}f(x)g(x) = f'(x)g(x) + f(x)g'(x)$
4.  $\frac{d}{dx}x^n = nx^{n-1}$
5.  $\frac{d}{dx}cf(x) = cf'(x)$
6.  $\frac{d}{dx}f(x) - g(x) = f'(x) - g'(x)$
7.  $\frac{d}{dx}\frac{f(x)}{g(x)} = \frac{g(x)f'(x) - f(x)g'(x)}{g(x)^2}$
8.  $\frac{d}{dx}f(g(x)) = f'(g(x)) \cdot g'(x)$

The above show the following rules : constant rule (1), constant multiple rule (5), sum rule (2 & 6), product rule (3), quotient rule (7), power rule (4), chain rule (8)

### Trig derivatives :

1.  $\frac{d}{dx}\sin x = \cos x$
2.  $\frac{d}{dx}\cos x = -\sin x$
3.  $\frac{d}{dx}\tan x = \sec^2 x$
4.  $\frac{d}{dx}\cot x = -\csc^2 x$
5.  $\frac{d}{dx}\sec x = \sec x \tan x$
6.  $\frac{d}{dx}\csc x = -\csc x \cot x$

### Trig Limits :

1.  $\lim_{x \rightarrow 0} \frac{\sin x}{x} = 1$
2.  $\lim_{x \rightarrow 0} \frac{\cos x - 1}{x} = 0$

**3.6 Derivatives as Rates of Change :** When it comes to questions related to position functions, you will have two especially common forms :

Determine the speed when the object hits the ground

1. Set  $s(t) = 0$  and find  $t$
2. Derive  $s(t)$  as  $s'(t) = v(t)$
3. Plug  $t$  into  $|v(t)|$

Determine the highest point of an object

1. Derive  $s(t)$  as  $s'(t) = v(t)$
2. Set  $v(t) = 0$  and find  $t$
3. Plug  $t$  into  $s(t)$