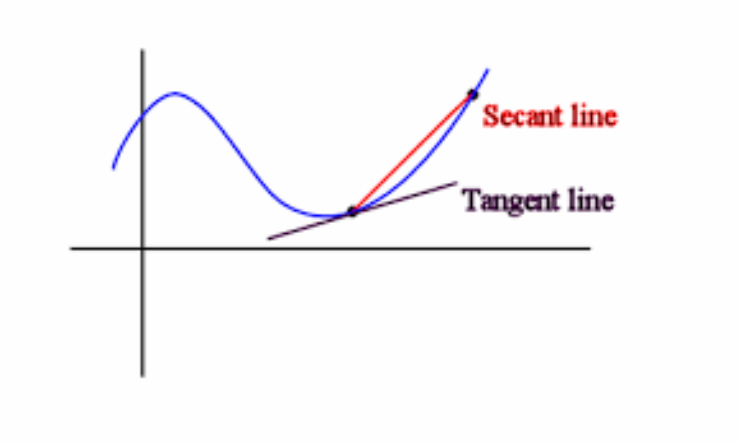
MATH 2554 : 2.1-2.3 Review Sheet

Some Problems From this section I recommend

— Section 2.1 : **6**
— Section 2.2 : 3, **17**, 51
— Section 2.3 : 22, 23, 25, 36, 37, **40**, **57**, **67**,

Especially important ones in **bold**

Key Concepts



The average velocity between two points is the **slope of the secant line** which can be found using the following equation :

$$v_{avg} = m_{sec} = \frac{s(t_1) - s(t_0)}{t_1 - t_0}$$

The slope of the tangent line or the **instantaneous velocity** for some $t_0 = a$ is simply the limit as t approaches a as shown below (note here a is a real numerical value... like "5" or "1.769") :

$$m_{tan} = \lim_{t \to a} m_{sec} = \lim_{t \to a} \frac{s(t) - s(a)}{t - a}$$

Definition (Limit of a Function) : Suppose the function f is defined for all x near a except possibly at a. If $f(x)$ is arbitrarily close to L (that is, as close to L as we like) for all x sufficiently close (but not equal) to a, we write

$$\lim_{x \to a} f(x) = L$$

Left-sided limit : Suppose that f is defined for all x near a with $x < a$. If $f(x)$ is arbitrarily close to L for all x sufficiently close to a with $x < a$, we write

$$\lim_{x \to a^-} f(x) = L$$

Right-sided limit : Suppose that f is defined for all x near a with $x > a$. If $f(x)$ is arbitrarily close to L for all x sufficiently close to a with $x > a$, we write

$$\lim_{x \to a^+} f(x) = L$$

For **linear** functions ($f(x) = mx + b$) specifically $\lim_{x \to a} f(x) = f(a) = ma + b$, otherwise you must follow the **Limit Laws**!

1. **Sum** $\lim_{x \to a}(f(x) + g(x)) = \lim_{x \to a} f(x) + \lim_{x \to a} g(x)$
2. **Constant Multiple** $\lim_{x \to a}(c \cdot f(x)) = c \cdot \lim_{x \to a} f(x)$
3. **Product** $\lim_{x \to a}(f(x) \cdot g(x)) = \left(\lim_{x \to a} f(x)\right) \cdot \left(\lim_{x \to a} g(x)\right)$
4. **Power** $\lim_{x \to a}(f(x))^n = \left(\lim_{x \to a} f(x)\right)^n$

Might seem straightforward enough, but things get a bit more complicated with the **Quotient** and **Root** laws...