

**Theorem 1.** *If a function  $f$  is differentiable at  $a \in \mathbb{R}$ , then  $f$  is continuous at  $a$ .*

**Theorem 2.** *For any differentiable function  $f$ , and any  $c \in \mathbb{R}$ ,*

$$\frac{d}{dx}(cf(x)) = c\frac{d}{dx}f(x).$$

**Theorem 3.** *For any differentiable functions  $f$  and  $g$ ,*

$$\frac{d}{dx}(f(x) + g(x)) = \frac{d}{dx}f(x) + \frac{d}{dx}g(x).$$

**Theorem 4.** *For any differentiable functions  $f$  and  $g$ ,  $(f(x)g(x))' = f(x)'g(x) + g'(x)f(x)$ .*

**Theorem 5.**  $(\sin(x))' = \cos(x)$ .

**Theorem 6.** *If for a differentiable function  $f$  on some interval  $(a, b)$ ,  $f'(x) = 0$ , then  $f$  is constant on  $(a, b)$ .*

**Theorem 7.** *If for a differentiable function  $f$  on some interval  $I$ ,  $f'(x) > 0$ , then  $f$  is (strictly) increasing on  $I$ .*

**Theorem 8.** *If for a differentiable function  $f$  on some interval  $I$ ,  $f'(x) < 0$ , then  $f$  is (strictly) decreasing on  $I$ .*