

## Formulas for Exam 2

### 1. Derivatives.

$y$	$x^n$	$e^x$	$b^x$	$\ln x$	$\log_b x$	$\sin x$	$\cos x$
$y'$	$nx^{n-1}$	$e^x$	$b^x \ln b$	$\frac{1}{x}$	$\frac{1}{x} \cdot \frac{1}{\ln b}$	$\cos x$	$-\sin x$

### 2. Rules of Differentiation

a) Product rule:

$$\text{If } y = f \cdot g, \text{ then } y' = f' \cdot g + g' \cdot f$$

b) Quotient rule:

$$\text{If } y = \frac{f}{g}, \text{ then } y' = \frac{f' \cdot g - g' \cdot f}{g^2}$$

c) Chain rule:

$$\text{If } y = f(g(x)), \text{ then } y' = f'(g(x)) \cdot g'(x)$$

### 3. Average and instantaneous rate of change.

a) The average rate of change of  $f(x)$  over  $[a, b]$ :  $\frac{f(b)-f(a)}{b-a}$

b) The instantaneous rate of change of  $f(x)$  at  $x = c$ :  $f'(c)$ .

4. **Tangent Line.**  $y_0 = f(x_0)$ ,  $m = f'(x_0)$

$$y - y_0 = m(x - x_0)$$

5. **Applications**  $v(t) = s'(t)$