MTHSC 102 Section 3.1-2 – Simple Rate of Change Formulas

Kevin James

Simple Derivative Rules

Rule Name	Function	Derivative
Constant Rule	$f(x) = b$	$f'(x) = 0$

Simple Derivative Rules

Rule Name	Function	Derivative
Constant Rule	$f(x) = b$	$f'(x) = 0$
Linear Function Rule	$f(x) = ax + b$	$f'(x) = a$

Simple Derivative Rules

Rule Name	Function	Derivative
Constant Rule	$f(x) = b$	$f'(x) = 0$
Linear Function Rule	$f(x) = ax + b$	$f'(x) = a$
Power Rule	$f(x) = x^n$	$f'(x) = nx^{n-1}$

Simple Derivative Rules

Rule Name	Function	Derivative
Constant Rule	$f(x) = b$	$f'(x) = 0$
Linear Function Rule	$f(x) = ax + b$	$f'(x) = a$
Power Rule	$f(x) = x^n$	$f'(x) = nx^{n-1}$
Constant Multiple Rule	$f(x) = kg(x)$	$f'(x) = kg'(x)$

Simple Derivative Rules

Rule Name	Function	Derivative
Constant Rule	$f(x) = b$	$f'(x) = 0$
Linear Function Rule	$f(x) = ax + b$	$f'(x) = a$
Power Rule	$f(x) = x^n$	$f'(x) = nx^{n-1}$
Constant Multiple Rule	$f(x) = kg(x)$	$f'(x) = kg'(x)$
Sum Rule	$f(x) = g(x) + h(x)$	$f'(x) = g'(x) + h'(x)$

Simple Derivative Rules

Rule Name	Function	Derivative
Constant Rule	$f(x) = b$	$f'(x) = 0$
Linear Function Rule	$f(x) = ax + b$	$f'(x) = a$
Power Rule	$f(x) = x^n$	$f'(x) = nx^{n-1}$
Constant Multiple Rule	$f(x) = kg(x)$	$f'(x) = kg'(x)$
Sum Rule	$f(x) = g(x) + h(x)$	$f'(x) = g'(x) + h'(x)$
Difference Rule	$f(x) = g(x) - h(x)$	$f'(x) = g'(x) - h'(x)$

Simple Derivative Rules

Rule Name	Function	Derivative
Constant Rule	$f(x) = b$	$f'(x) = 0$
Linear Function Rule	$f(x) = ax + b$	$f'(x) = a$
Power Rule	$f(x) = x^n$	$f'(x) = nx^{n-1}$
Constant Multiple Rule	$f(x) = kg(x)$	$f'(x) = kg'(x)$
Sum Rule	$f(x) = g(x) + h(x)$	$f'(x) = g'(x) + h'(x)$
Difference Rule	$f(x) = g(x) - h(x)$	$f'(x) = g'(x) - h'(x)$
Exponential Rule	$f(x) = b^x \ (b > 0)$	$f'(x) = (\ln b)b^x$

Simple Derivative Rules

Rule Name	Function	Derivative
Constant Rule	$f(x) = b$	$f'(x) = 0$
Linear Function Rule	$f(x) = ax + b$	$f'(x) = a$
Power Rule	$f(x) = x^n$	$f'(x) = nx^{n-1}$
Constant Multiple Rule	$f(x) = kg(x)$	$f'(x) = kg'(x)$
Sum Rule	$f(x) = g(x) + h(x)$	$f'(x) = g'(x) + h'(x)$
Difference Rule	$f(x) = g(x) - h(x)$	$f'(x) = g'(x) - h'(x)$
Exponential Rule	$f(x) = b^x \ (b > 0)$	$f'(x) = (\ln b)b^x$
e^x Rule	$f(x) = e^x$	$f'(x) = e^x$

Simple Derivative Rules

Rule Name	Function	Derivative
Constant Rule	$f(x) = b$	$f'(x) = 0$
Linear Function Rule	$f(x) = ax + b$	$f'(x) = a$
Power Rule	$f(x) = x^n$	$f'(x) = nx^{n-1}$
Constant Multiple Rule	$f(x) = kg(x)$	$f'(x) = kg'(x)$
Sum Rule	$f(x) = g(x) + h(x)$	$f'(x) = g'(x) + h'(x)$
Difference Rule	$f(x) = g(x) - h(x)$	$f'(x) = g'(x) - h'(x)$
Exponential Rule	$f(x) = b^x \ (b > 0)$	$f'(x) = (\ln b)b^x$
e^x Rule	$f(x) = e^x$	$f'(x) = e^x$
Natural Log Rule	$f(x) = \ln(x), \ (x > 0)$	$f'(x) = \frac{1}{x}$

Alternative Simple Derivative Rules

Rule Name	Rule
Constant Rule	$\frac{d}{dx}[b] = 0$

Alternative Simple Derivative Rules

Rule Name	Rule
Constant Rule	$\frac{\mathrm{d}}{\mathrm{dx}}[b] = 0$
Linear Function Rule	$\frac{\mathrm{d}}{\mathrm{dx}}[ax + b] = a$

Alternative Simple Derivative Rules

Rule Name	**Rule**
Constant Rule	$\frac{d}{dx}[b] = 0$
Linear Function Rule	$\frac{d}{dx}[ax + b] = a$
Power Rule	$\frac{d}{dx}[x^n] = nx^{n-1}$

Alternative Simple Derivative Rules

Rule Name	Rule
Constant Rule	$\frac{\mathrm{d}}{\mathrm{dx}}[b] = 0$
Linear Function Rule	$\frac{\mathrm{d}}{\mathrm{dx}}[ax + b] = a$
Power Rule	$\frac{\mathrm{d}}{\mathrm{dx}}[x^n] = nx^{n-1}$
Constant Multiple Rule	$\frac{\mathrm{d}}{\mathrm{dx}}[kf(x)] = k\frac{\mathrm{d}}{\mathrm{dx}}[f(x)]$

Alternative Simple Derivative Rules

Rule Name	Rule
Constant Rule	$\frac{d}{dx}[b] = 0$
Linear Function Rule	$\frac{d}{dx}[ax + b] = a$
Power Rule	$\frac{d}{dx}[x^n] = nx^{n-1}$
Constant Multiple Rule	$\frac{d}{dx}[kf(x)] = k\frac{d}{dx}[f(x)]$
Sum Rule	$\frac{d}{dx}[f(x) + g(x)] = \frac{d}{dx}[f(x)] + \frac{d}{dx}[g(x)]$

Alternative Simple Derivative Rules

Rule Name	Rule
Constant Rule	$\frac{d}{dx}[b] = 0$
Linear Function Rule	$\frac{d}{dx}[ax + b] = a$
Power Rule	$\frac{d}{dx}[x^n] = nx^{n-1}$
Constant Multiple Rule	$\frac{d}{dx}[kf(x)] = k\frac{d}{dx}[f(x)]$
Sum Rule	$\frac{d}{dx}[f(x) + g(x)] = \frac{d}{dx}[f(x)] + \frac{d}{dx}[g(x)]$
Difference Rule	$\frac{d}{dx}[f(x) - g(x)]\frac{d}{dx}[f(x)] - \frac{d}{dx}[g(x)]$

Alternative Simple Derivative Rules

Rule Name	Rule
Constant Rule	$\frac{\mathrm{d}}{\mathrm{dx}}[b] = 0$
Linear Function Rule	$\frac{\mathrm{d}}{\mathrm{dx}}[ax + b] = a$
Power Rule	$\frac{\mathrm{d}}{\mathrm{dx}}[x^n] = nx^{n-1}$
Constant Multiple Rule	$\frac{\mathrm{d}}{\mathrm{dx}}[kf(x)] = k\frac{\mathrm{d}}{\mathrm{dx}}[f(x)]$
Sum Rule	$\frac{\mathrm{d}}{\mathrm{dx}}[f(x) + g(x)] = \frac{\mathrm{d}}{\mathrm{dx}}[f(x)] + \frac{\mathrm{d}}{\mathrm{dx}}[g(x)]$
Difference Rule	$\frac{\mathrm{d}}{\mathrm{dx}}[f(x) - g(x)]\frac{\mathrm{d}}{\mathrm{dx}}[f(x)] - \frac{\mathrm{d}}{\mathrm{dx}}[g(x)]$
Exponential Rule	If $b > 0$, $\frac{\mathrm{d}}{\mathrm{dx}}[b^x] = (\ln b)b^x$

Alternative Simple Derivative Rules

Rule Name	Rule
Constant Rule	$\frac{d}{dx}[b] = 0$
Linear Function Rule	$\frac{d}{dx}[ax + b] = a$
Power Rule	$\frac{d}{dx}[x^n] = nx^{n-1}$
Constant Multiple Rule	$\frac{d}{dx}[kf(x)] = k\frac{d}{dx}[f(x)]$
Sum Rule	$\frac{d}{dx}[f(x) + g(x)] = \frac{d}{dx}[f(x)] + \frac{d}{dx}[g(x)]$
Difference Rule	$\frac{d}{dx}[f(x) - g(x)]\frac{d}{dx}[f(x)] - \frac{d}{dx}[g(x)]$
Exponential Rule	If $b > 0$, $\frac{d}{dx}[b^x] = (\ln b)b^x$
e^x Rule	$\frac{d}{dx}[e^x] = e^x$

Alternative Simple Derivative Rules

Rule Name	**Rule**
Constant Rule	$\frac{\mathrm{d}}{\mathrm{dx}}[b] = 0$
Linear Function Rule	$\frac{\mathrm{d}}{\mathrm{dx}}[ax+b] = a$
Power Rule	$\frac{\mathrm{d}}{\mathrm{dx}}[x^n] = nx^{n-1}$
Constant Multiple Rule	$\frac{\mathrm{d}}{\mathrm{dx}}[kf(x)] = k\frac{\mathrm{d}}{\mathrm{dx}}[f(x)]$
Sum Rule	$\frac{\mathrm{d}}{\mathrm{dx}}[f(x)+g(x)] = \frac{\mathrm{d}}{\mathrm{dx}}[f(x)] + \frac{\mathrm{d}}{\mathrm{dx}}[g(x)]$
Difference Rule	$\frac{\mathrm{d}}{\mathrm{dx}}[f(x)-g(x)]\frac{\mathrm{d}}{\mathrm{dx}}[f(x)] - \frac{\mathrm{d}}{\mathrm{dx}}[g(x)]$
Exponential Rule	If $b > 0$, $\frac{\mathrm{d}}{\mathrm{dx}}[b^x] = (\ln b)b^x$
e^x Rule	$\frac{\mathrm{d}}{\mathrm{dx}}[e^x] = e^x$
Natural Log Rule	If $x > 0$, $\frac{\mathrm{d}}{\mathrm{dx}}[\ln(x)] = \frac{1}{x}$

Example

Suppose that $f(x) = 3x^3 - 4x^2 + 3x + 5e^x - 8\ln(x)$. Give a formula for $f'(x)$.