Differentialkvotient for $f(x) = g(x) \cdot h(x)$

Differentialkvotient for $f(x) = g(x) \cdot h(x)$, hvor g og h er en differentiable funktioner.

Trin 1: Indsæt funktionen i differenskvotienten

$$\frac{\Delta y}{\Delta x} = \frac{f(x_0 + \boldsymbol{h}) - f(x_0)}{\boldsymbol{h}}$$

Differentialkvotient for $f(x) = g(x) \cdot h(x)$

Differentialkvotient for $f(x) = g(x) \cdot h(x)$, hvor g og h er en differentiable funktioner.

Trin 1: Indsæt funktionen i differenskvotienten

$$\frac{f(x_0 + \boldsymbol{h}) - f(x_0)}{\boldsymbol{h}} = \frac{g(x_0 + \boldsymbol{h}) \cdot h(x_0 + \boldsymbol{h}) - (g(x_0) \cdot h(x_0))}{\boldsymbol{h}}$$

Differentialkvotient for $f(x) = g(x) \cdot h(x)$

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$$\frac{f(x_0 + \boldsymbol{h}) - f(x_0)}{\boldsymbol{h}} = \frac{g(x_0 + \boldsymbol{h}) \cdot h(x_0 + \boldsymbol{h}) - (g(x_0) \cdot h(x_0))}{\boldsymbol{h}}$$

Trin 2: Reducer differenskvotienten

Differentialkvotient for $f(x) = g(x) \cdot h(x)$

Differentialkvotient for $f(x) = g(x) \cdot h(x)$, hvor g og h er en differentiable funktioner.

Trin 1: Indsæt funktionen i differenskvotienten

$$\frac{f(x_0 + \boldsymbol{h}) - f(x_0)}{\boldsymbol{h}} = \frac{g(x_0 + \boldsymbol{h}) \cdot h(x_0 + \boldsymbol{h}) - (g(x_0) \cdot h(x_0))}{\boldsymbol{h}}$$

Trin 2: Reducer differenskvotienten

$$\frac{g(x_0 + h) \cdot h(x_0 + \boldsymbol{h}) - (g(x_0) \cdot h(x_0))}{\boldsymbol{h}} = \frac{g(x_0 + \boldsymbol{h}) \cdot h(x_0 + \boldsymbol{h}) - g(x_0) \cdot h(x_0)}{\boldsymbol{h}}$$

Differentialkvotient for $f(x) = g(x) \cdot h(x)$

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Trin 1: Indsæt funktionen i differenskvotienten

$$\frac{f(x_0 + \boldsymbol{h}) - f(x_0)}{\boldsymbol{h}} = \frac{g(x_0 + \boldsymbol{h}) \cdot h(x_0 + \boldsymbol{h}) - (g(x_0) \cdot h(x_0))}{\boldsymbol{h}}$$

Trin 2: Reducer differenskvotienten

$$\frac{g(x_0 + \boldsymbol{h}) \cdot h(x_0 + \boldsymbol{h}) - g(x_0) \cdot h(x_0) + g(x_0) \cdot h(x_0 + \boldsymbol{h}) - g(x_0) \cdot h(x_0 + \boldsymbol{h})}{\boldsymbol{h}}$$

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Trin 2: Reducer differenskvotienten

$$\frac{g(x_0 + \boldsymbol{h}) \cdot h(x_0 + \boldsymbol{h}) - g(x_0) \cdot h(x_0) + g(x_0) \cdot h(x_0 + \boldsymbol{h}) - g(x_0) \cdot h(x_0 + \boldsymbol{h})}{\boldsymbol{h}}$$

Differentialkvotient for $f(x) = g(x) \cdot h(x)$

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Trin 1: Indsæt funktionen i differenskvotienten

$$\frac{f(x_0+\boldsymbol{h})-f(x_0)}{\boldsymbol{h}} = \frac{g(x_0+\boldsymbol{h})\cdot h(x_0+\boldsymbol{h})-(g(x_0)\cdot h(x_0))}{\boldsymbol{h}}$$

Trin 2: Reducer differenskvotienten

$$\frac{g(x_0+\boldsymbol{h})\cdot h(x_0+\boldsymbol{h})+g(x_0)\cdot(h(x_0+\boldsymbol{h})-h(x_0))-g(x_0)\cdot h(x_0+\boldsymbol{h})}{\boldsymbol{h}}$$

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$$\frac{f(x_0 + \boldsymbol{h}) - f(x_0)}{\boldsymbol{h}} = \frac{g(x_0 + \boldsymbol{h}) \cdot h(x_0 + \boldsymbol{h}) - (g(x_0) \cdot h(x_0))}{\boldsymbol{h}}$$

Trin 2: Reducer differenskvotienten

$$\frac{g(x_0) \cdot (h(x_0 + \boldsymbol{h}) - h(x_0)) + g(x_0 + \boldsymbol{h}) \cdot h(x_0 + \boldsymbol{h}) - g(x_0) \cdot h(x_0 + \boldsymbol{h})}{\boldsymbol{h}}$$

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Trin 2: Reducer differenskvotienten

$$\frac{g(x_0) \cdot (h(x_0 + \boldsymbol{h}) - h(x_0)) + g(x_0 + \boldsymbol{h}) \cdot h(x_0 + \boldsymbol{h}) - g(x_0) \cdot h(x_0 + \boldsymbol{h})}{\boldsymbol{h}}$$

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Trin 2: Reducer differenskvotienten

$$\frac{g(x_0) \cdot (h(x_0 + \boldsymbol{h}) - h(x_0)) + h(x_0 + \boldsymbol{h}) \cdot (g(x_0 + \boldsymbol{h}) - g(x_0))}{\boldsymbol{h}}$$

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Trin 2: Reducer differenskvotienten

$$\frac{g(x_0) \cdot (h(x_0 + \boldsymbol{h}) - h(x_0))}{\boldsymbol{h}} + \frac{h(x_0 + \boldsymbol{h}) \cdot (g(x_0 + \boldsymbol{h}) - g(x_0))}{\boldsymbol{h}}$$

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Trin 2: Reducer differenskvotienten

$$g(x_0) \cdot \frac{(h(x_0 + \boldsymbol{h}) - h(x_0))}{\boldsymbol{h}} + h(x_0 + \boldsymbol{h}) \cdot \frac{(g(x_0 + \boldsymbol{h}) - g(x_0))}{\boldsymbol{h}}$$

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Differentialkvotient for $f(x) = g(x) \cdot h(x)$, hvor g og h er en differentiable funktioner.

Trin 1: Indsæt funktionen i differenskvotienten

$$\frac{f(x_0+\boldsymbol{h})-f(x_0)}{\boldsymbol{h}} = \frac{g(x_0+\boldsymbol{h})\cdot h(x_0+\boldsymbol{h})-(g(x_0)\cdot h(x_0))}{\boldsymbol{h}}$$

Trin 2: Reducer differenskvotienten

$$g(x_0)\cdot\frac{(h(x_0+\boldsymbol{h})-h(x_0))}{\boldsymbol{h}}+h(x_0+\boldsymbol{h})\cdot\frac{(g(x_0+\boldsymbol{h})-g(x_0))}{\boldsymbol{h}}$$

Trin 3: Udregn grænseværdien

Differentialkvotient for $f(x) = g(x) \cdot h(x)$

Differentialkvotient for $f(x) = g(x) \cdot h(x)$, hvor g og h er en differentiable funktioner.

Trin 1: Indsæt funktionen i differenskvotienten

$$\frac{f(x_0+\boldsymbol{h}) - f(x_0)}{\boldsymbol{h}} = \frac{g(x_0+\boldsymbol{h}) \cdot h(x_0+\boldsymbol{h}) - (g(x_0) \cdot h(x_0))}{\boldsymbol{h}}$$

Trin 2: Reducer differenskvotienten

$$g(x_0) \cdot \frac{(h(x_0+\boldsymbol{h}) - h(x_0))}{\boldsymbol{h}} + h(x_0+\boldsymbol{h}) \cdot \frac{(g(x_0+\boldsymbol{h}) - g(x_0))}{\boldsymbol{h}}$$

Trin 3: Udregn grænseværdien

$$\lim_{\boldsymbol{h}\to 0} \left[g(x_0) \cdot \frac{(h(x_0+\boldsymbol{h}) - h(x_0))}{\boldsymbol{h}} + h(x_0+\boldsymbol{h}) \cdot \frac{(g(x_0+\boldsymbol{h}) - g(x_0))}{\boldsymbol{h}} \right]$$

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$$\frac{f(x_0 + \boldsymbol{h}) - f(x_0)}{\boldsymbol{h}} = \frac{g(x_0 + \boldsymbol{h}) \cdot h(x_0 + \boldsymbol{h}) - (g(x_0) \cdot h(x_0))}{\boldsymbol{h}}$$

Trin 2: Reducer differenskvotienten

$$g(x_0) \cdot \frac{(h(x_0 + \boldsymbol{h}) - h(x_0))}{\boldsymbol{h}} + h(x_0 + \boldsymbol{h}) \cdot \frac{(g(x_0 + \boldsymbol{h}) - g(x_0))}{\boldsymbol{h}}$$

Trin 3: Udregn grænseværdien

$$\lim_{\boldsymbol{h} \to 0} g(x_0) \cdot \lim_{\boldsymbol{h} \to 0} \frac{(h(x_0 + \boldsymbol{h}) - h(x_0))}{\boldsymbol{h}} + \lim_{\boldsymbol{h} \to 0} h(x_0 + \boldsymbol{h}) \cdot \lim_{\boldsymbol{h} \to 0} \frac{(g(x_0 + \boldsymbol{h}) - g(x_0))}{\boldsymbol{h}}$$

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$$\frac{f(x_0 + \boldsymbol{h}) - f(x_0)}{\boldsymbol{h}} = \frac{g(x_0 + \boldsymbol{h}) \cdot h(x_0 + \boldsymbol{h}) - (g(x_0) \cdot h(x_0))}{\boldsymbol{h}}$$

Trin 2: Reducer differenskvotienten

$$g(x_0) \cdot \frac{(h(x_0 + \boldsymbol{h}) - h(x_0))}{\boldsymbol{h}} + h(x_0 + \boldsymbol{h}) \cdot \frac{(g(x_0 + \boldsymbol{h}) - g(x_0))}{\boldsymbol{h}}$$

Trin 3: Udregn grænseværdien

$$g(x_0) \cdot \lim_{\boldsymbol{h} \to 0} \frac{(h(x_0 + \boldsymbol{h}) - h(x_0))}{\boldsymbol{h}} + \lim_{\boldsymbol{h} \to 0} h(x_0 + \boldsymbol{h}) \cdot \lim_{\boldsymbol{h} \to 0} \frac{(g(x_0 + \boldsymbol{h}) - g(x_0))}{\boldsymbol{h}}$$

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Trin 2: Reducer differenskvotienten

$$g(x_0) \cdot \frac{(h(x_0+\boldsymbol{h}) - h(x_0))}{\boldsymbol{h}} + h(x_0+\boldsymbol{h}) \cdot \frac{(g(x_0+\boldsymbol{h}) - g(x_0))}{\boldsymbol{h}}$$

Trin 3: Udregn grænseværdien

$$g(x_0) \cdot h'(x_0) + \lim_{\boldsymbol{h}\to 0} h(x_0+\boldsymbol{h}) \cdot \lim_{\boldsymbol{h}\to 0} \frac{(g(x_0+\boldsymbol{h}) - g(x_0))}{\boldsymbol{h}}$$

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$$\frac{f(x_0+\boldsymbol{h}) - f(x_0)}{\boldsymbol{h}} = \frac{g(x_0+\boldsymbol{h}) \cdot h(x_0+\boldsymbol{h}) - (g(x_0) \cdot h(x_0))}{\boldsymbol{h}}$$

Trin 2: Reducer differenskvotienten

$$g(x_0) \cdot \frac{(h(x_0+\boldsymbol{h}) - h(x_0))}{\boldsymbol{h}} + h(x_0+\boldsymbol{h}) \cdot \frac{(g(x_0+\boldsymbol{h}) - g(x_0))}{\boldsymbol{h}}$$

Trin 3: Udregn grænseværdien

$$g(x_0) \cdot h'(x_0) + h(x_0) \cdot \lim_{\boldsymbol{h} \to 0} \frac{(g(x_0+\boldsymbol{h}) - g(x_0))}{\boldsymbol{h}}$$

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$$\frac{f(x_0 + \boldsymbol{h}) - f(x_0)}{\boldsymbol{h}} = \frac{g(x_0 + \boldsymbol{h}) \cdot h(x_0 + \boldsymbol{h}) - (g(x_0) \cdot h(x_0))}{\boldsymbol{h}}$$

Trin 2: Reducer differenskvotienten

$$g(x_0) \cdot \frac{(h(x_0 + \boldsymbol{h}) - h(x_0))}{\boldsymbol{h}} + h(x_0 + \boldsymbol{h}) \cdot \frac{(g(x_0 + \boldsymbol{h}) - g(x_0))}{\boldsymbol{h}}$$

Trin 3: Udregn grænseværdien

$$g(x_0) \cdot h'(x_0) + h(x_0) \cdot g'(x_0)$$

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$$\frac{f(x_0 + \boldsymbol{h}) - f(x_0)}{\boldsymbol{h}} = \frac{g(x_0 + \boldsymbol{h}) \cdot h(x_0 + \boldsymbol{h}) - (g(x_0) \cdot h(x_0))}{\boldsymbol{h}}$$

Trin 2: Reducer differenskvotienten

$$g(x_0) \cdot \frac{(h(x_0 + \boldsymbol{h}) - h(x_0))}{\boldsymbol{h}} + h(x_0 + \boldsymbol{h}) \cdot \frac{(g(x_0 + \boldsymbol{h}) - g(x_0))}{\boldsymbol{h}}$$

Trin 3: Udregn grænseværdien

$$f'(x) = g(x) \cdot h'(x) + h(x) \cdot g'(x)$$

Differentialkvotient for $f(x) = g(x) \cdot h(x)$

Differentialkvotient for $f(x) = g(x) \cdot h(x)$, hvor g og h er en differentiable funktioner.

Trin 1: Indsæt funktionen i differenskvotienten

$$\frac{f(x_0+\boldsymbol{h}) - f(x_0)}{\boldsymbol{h}} = \frac{g(x_0+\boldsymbol{h}) \cdot h(x_0+\boldsymbol{h}) - (g(x_0) \cdot h}{\boldsymbol{h}}$$

Trin 2: Reducer differenskvotienten

$$g(x_0) \cdot \frac{(h(x_0+\boldsymbol{h}) - h(x_0))}{\boldsymbol{h}} + h(x_0+\boldsymbol{h}) \cdot \frac{(g(x_0+\boldsymbol{h}) - }{\boldsymbol{h}}$$

Trin 3: Udregn grænseværdien

$$f'(x) = g(x) \cdot h'(x) + h(x) \cdot g'(x)$$

f	f'	
$g+h$	$g'+h'$	(10)
$k \cdot g(x)$	$k \cdot g'(x)$	(11)
		(12)
		(13)
		(14)
		(15)

Differentialkvotient for $f(x) = g(x) \cdot h(x)$

Differentialkvotient for $f(x) = g(x) \cdot h(x)$, hvor g og h er en differentiable funktioner.

Trin 1: Indsæt funktionen i differenskvotienten

$$\frac{f(x_0+\boldsymbol{h}) - f(x_0)}{\boldsymbol{h}} = \frac{g(x_0+\boldsymbol{h}) \cdot h(x_0+\boldsymbol{h}) - (g(x_0) \cdot h}{\boldsymbol{h}}$$

Trin 2: Reducer differenskvotienten

$$g(x_0) \cdot \frac{(h(x_0+\boldsymbol{h}) - h(x_0))}{\boldsymbol{h}} + h(x_0+\boldsymbol{h}) \cdot \frac{(g(x_0+\boldsymbol{h}) -}{\boldsymbol{h}}$$

Trin 3: Udregn grænseværdien

$$f'(x) = g(x) \cdot h'(x) + h(x) \cdot g'(x)$$

f	f'	
$g + h$	$g' + h'$	(10)
$k \cdot g(x)$	$k \cdot g'(x)$	(11)
$g \cdot h$	$g' \cdot h + g \cdot h'$	(12)
		(13)
		(14)
		(15)

Anvendelse af regneregler

Bestem f' for følgende funktioner.

$$f(x) = x^3 \cdot \ln(x)$$

$$f(x) = e^x \cdot \frac{1}{x}$$

$$f(x) = e^{3x} \cdot 4x$$

f	f'	
$g + h$	$g' + h'$	(10)
$k \cdot g(x)$	$k \cdot g'(x)$	(11)
$g \cdot h$	$g' \cdot h + g \cdot h'$	(12)
		(13)
		(14)
		(15)

f	f'	
k	0	(1)
$k \cdot x$	k	(2)
x^n	$n \cdot x^{n-1}$	(3)
$\frac{1}{x}$	$-\frac{1}{x^2}$	(4)
$\sqrt{x}$	$\frac{1}{2\sqrt{x}}$	(5)
e^x	e^x	(6)
$e^{k \cdot x}$	$k \cdot e^{k \cdot x}$	(7)
$\ln(x)$	$\frac{1}{x}$	(8)
a^x	$a^x \cdot \ln(a)$	(9)

Anvendelse af regneregler

Bestem f' for følgende funktioner.

$$f(x) = x^3 \cdot \ln(x) \Rightarrow f'(x) = 3x^{3-1} \cdot \ln(x) + x^3 \cdot \frac{1}{x}$$

$$f(x) = e^x \cdot \frac{1}{x}$$

$$f(x) = e^{3x} \cdot 4x$$

f	f'	
$g+h$	$g'+h'$	(10)
$k \cdot g(x)$	$k \cdot g'(x)$	(11)
$g \cdot h$	$g' \cdot h + g \cdot h'$	(12)
		(13)
		(14)
		(15)

f	f'	
k	0	(1)
$k \cdot x$	k	(2)
x^n	$n \cdot x^{n-1}$	(3)
$\frac{1}{x}$	$-\frac{1}{x^2}$	(4)
$\sqrt{x}$	$\frac{1}{2\sqrt{x}}$	(5)
e^x	e^x	(6)
$e^{k \cdot x}$	$k \cdot e^{k \cdot x}$	(7)
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f	f'	
$g+h$	$g'+h'$	(10)
$k \cdot g(x)$	$k \cdot g'(x)$	(11)
$g \cdot h$	$g' \cdot h + g \cdot h'$	(12)
		(13)
		(14)
		(15)

f	f'	
k	0	(1)
$k \cdot x$	k	(2)
x^n	$n \cdot x^{n-1}$	(3)
$\frac{1}{x}$	$-\frac{1}{x^2}$	(4)
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Anvendelse af regneregler

Bestem f' for følgende funktioner.

$$f(x) = x^3 \cdot \ln(x) \Rightarrow f'(x) = 3x^2 \cdot \ln(x) + x^2$$

$$f(x) = e^x \cdot \frac{1}{x} \Rightarrow f'(x) = e^x \cdot (-\frac{1}{x^2}) + e^x \cdot \frac{1}{x}$$

$$f(x) = e^{3x} \cdot 4x$$

f	f'	
$g+h$	$g'+h'$	(10)
$k \cdot g(x)$	$k \cdot g'(x)$	(11)
$g \cdot h$	$g' \cdot h + g \cdot h'$	(12)
		(13)
		(14)
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f	f'	
k	0	(1)
$k \cdot x$	k	(2)
x^n	$n \cdot x^{n-1}$	(3)
$\frac{1}{x}$	$-\frac{1}{x^2}$	(4)
$\sqrt{x}$	$\frac{1}{2\sqrt{x}}$	(5)
e^x	e^x	(6)
$e^{k \cdot x}$	$k \cdot e^{k \cdot x}$	(7)
$\ln(x)$	$\frac{1}{x}$	(8)
a^x	$a^x \cdot \ln(a)$	(9)

Anvendelse af regneregler

Bestem f' for følgende funktioner.

$$f(x) = x^3 \cdot \ln(x) \Rightarrow f'(x) = 3x^2 \cdot \ln(x) + x^2$$

$$f(x) = e^x \cdot \frac{1}{x} \Rightarrow f'(x) = -\frac{e^x}{x^2} + \frac{e^x}{x}$$

$$f(x) = e^{3x} \cdot 4x$$

f	f'	
$g + h$	$g' + h'$	(10)
$k \cdot g(x)$	$k \cdot g'(x)$	(11)
$g \cdot h$	$g' \cdot h + g \cdot h'$	(12)
		(13)
		(14)
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f	f'	
k	0	(1)
$k \cdot x$	k	(2)
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$\frac{1}{x}$	$-\frac{1}{x^2}$	(4)
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Anvendelse af regneregler

Bestem f' for følgende funktioner.

$$f(x) = x^3 \cdot \ln(x) \Rightarrow f'(x) = 3x^2 \cdot \ln(x) + x^2$$

$$f(x) = e^x \cdot \frac{1}{x} \Rightarrow f'(x) = -\frac{e^x}{x^2} + \frac{e^x}{x}$$

$$f(x) = e^{3x} \cdot 4x \Rightarrow f'(x) = 3e^{3x} \cdot 4x + e^{3x} \cdot 4$$

f	f'	
$g+h$	$g'+h'$	(10)
$k \cdot g(x)$	$k \cdot g'(x)$	(11)
$g \cdot h$	$g' \cdot h + g \cdot h'$	(12)
		(13)
		(14)
		(15)

f	f'	
k	0	(1)
$k \cdot x$	k	(2)
x^n	$n \cdot x^{n-1}$	(3)
$\frac{1}{x}$	$-\frac{1}{x^2}$	(4)
$\sqrt{x}$	$\frac{1}{2\sqrt{x}}$	(5)
e^x	e^x	(6)
$e^{k \cdot x}$	$k \cdot e^{k \cdot x}$	(7)
$\ln(x)$	$\frac{1}{x}$	(8)
a^x	$a^x \cdot \ln(a)$	(9)

Anvendelse af regneregler

Bestem f' for følgende funktioner.

$$f(x) = x^3 \cdot \ln(x) \;\Rightarrow\; f'(x) = 3x^2 \cdot \ln(x) + x^2$$

$$f(x) = e^x \cdot \frac{1}{x} \;\Rightarrow\; f'(x) = -\frac{e^x}{x^2} + \frac{e^x}{x}$$

$$f(x) = e^{3x} \cdot 4x \;\Rightarrow\; f'(x) = 12x \cdot e^{3x} + 4 \cdot e^{3x}$$

f	f'	
k	0	(1)
$k \cdot x$	k	(2)
x^n	$n \cdot x^{n-1}$	(3)
$\frac{1}{x}$	$-\frac{1}{x^2}$	(4)
$\sqrt{x}$	$\frac{1}{2\sqrt{x}}$	(5)
e^x	e^x	(6)
$e^{k \cdot x}$	$k \cdot e^{k \cdot x}$	(7)
$\ln(x)$	$\frac{1}{x}$	(8)
a^x	$a^x \cdot \ln(a)$	(9)

f	f'	
$g + h$	$g' + h'$	(10)
$k \cdot g(x)$	$k \cdot g'(x)$	(11)
$g \cdot h$	$g' \cdot h + g \cdot h'$	(12)
		(13)
		(14)
		(15)