Differentialkvotient for $f(x) = g(x) + h(x)$

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

Trin 1: Indsæt funktionen i differenskvotienten

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

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

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Trin 2: Reducer differenskvotienten

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

Trin 2: Reducer differenskvotienten

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

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Trin 2: Reducer differenskvotienten

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

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Trin 2: Reducer differenskvotienten

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

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Trin 3: Udregn grænseværdien

Differentialkvotient for $f(x) = g(x) + h(x)$

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

Trin 2: Reducer differenskvotienten

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

Trin 3: Udregn grænseværdien

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

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Trin 2: Reducer differenskvotienten

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

Trin 3: Udregn grænseværdien

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

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Trin 1: Indsæt funktionen i differenskvotienten

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

f	f'	
		(10)
		(11)
		(12)
		(13)
		(14)

Trin 2: Reducer differenskvotienten

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

Trin 3: Udregn grænseværdien

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

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

f	f'	
$g+h$	$g'+h'$	(10)
		(11)
		(12)
		(13)
		(14)

Trin 2: Reducer differenskvotienten

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

Trin 3: Udregn grænseværdien

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

Anvendelse af regneregler

Bestem f' for følgende funktioner.

$$f(x) = x^3 + x^2$$
$$f(x) = x^5 + e^x$$
$$f(x) = \ln(x) - 5$$

f	f'	
$g + h$	$g' + h'$	(10)
		(11)
		(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.

$$f(x) = x^3 + x^2 \Rightarrow f'(x) = 3x^{3-1} + 2x^{2-1}$$

$$f(x) = x^5 + e^x$$

$$f(x) = \ln(x) - 5$$

f	f'	
$g + h$	$g' + h'$	(10)
		(11)
		(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.

$$f(x) = x^3 + x^2 \Rightarrow f'(x) = 3x^2 + 2x$$
$$f(x) = x^5 + e^x$$
$$f(x) = \ln(x) - 5$$

f	f'	
$g + h$	$g' + h'$	(10)
		(11)
		(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.

$$f(x) = x^3 + x^2 \Rightarrow f'(x) = 3x^2 + 2x$$
$$f(x) = x^5 + e^x \Rightarrow f'(x) = 5x^{5-1} + e^x$$
$$f(x) = \ln(x) - 5$$

f	f'	
$g + h$	$g' + h'$	(10)
		(11)
		(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.

$$f(x) = x^3 + x^2 \Rightarrow f'(x) = 3x^2 + 2x$$
$$f(x) = x^5 + e^x \Rightarrow f'(x) = 5x^4 + e^x$$
$$f(x) = \ln(x) - 5$$

f	f'	
$g + h$	$g' + h'$	(10)
		(11)
		(12)
		(13)
		(14)
		(15)

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

Anvendelse af regneregler

Bestem f' for følgende funktioner.

$$f(x) = x^3 + x^2 \Rightarrow f'(x) = 3x^2 + 2x$$
$$f(x) = x^5 + e^x \Rightarrow f'(x) = 5x^4 + e^x$$
$$f(x) = \ln(x) - 5 \Rightarrow f'(x) = \frac{1}{x} - 0$$

f	f'	
$g + h$	$g' + h'$	(10)
		(11)
		(12)
		(13)
		(14)
		(15)

f	f'	
k	0	(1)
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$$f(x) = x^3 + x^2 \Rightarrow f'(x) = 3x^2 + 2x$$
$$f(x) = x^5 + e^x \Rightarrow f'(x) = 5x^4 + e^x$$
$$f(x) = \ln(x) - 5 \Rightarrow f'(x) = \frac{1}{x}$$

f	f'	
$g + h$	$g' + h'$	(10)
		(11)
		(12)
		(13)
		(14)
		(15)

f	f'	
k	0	(1)
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$e^{k \cdot x}$	$k \cdot e^{k \cdot x}$	(7)
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