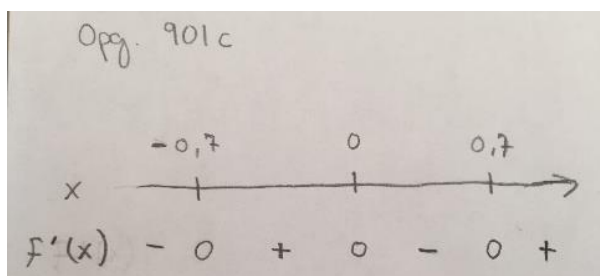


# Facitliste – opgaver 9

## Opg. 901

- a.  $f'(x) = 4x^3 - 2x$   
b.  $x = -0,7$  og  $x = 0,7$   
c.



$f$  er aftagende i intervallerne  $]-\infty ; -0,7]$  og  $[0 ; 0,7]$

$f$  er voksende i intervallerne  $[-0,7 ; 0]$  og  $[0,7 ; \infty[$

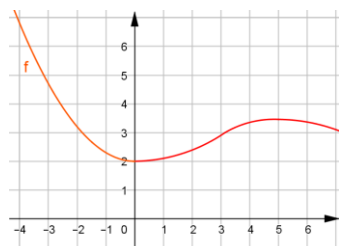
- d. Lokalt maksimum:  $(0, 0)$   
Lokale minima:  $(-0,7 ; -0,25)$  og  $(0,7 ; -0,25)$

## Opg. 902

- a. Nej

## Opg. 903

- a.



## Opg. 904

- a.  $f$  er aftagende i intervallet  $]-\infty ; 1]$   
 $f$  er voksende i intervallet  $[1 ; \infty[$   
Lokalt minimum:  $(1, -1)$

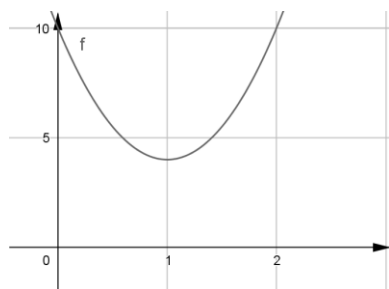
**Opg. 905**

- a.  $f$  er voksende i intervallet  $[0 ; \infty[$
- b.  $f$  er voksende i intervallet  $]-\infty ; \infty[$
- c.  $f$  er aftagende i intervallet  $]-\infty ; \infty[$
- d.  $f$  er voksende i intervallerne  $]-\infty ; -1]$  og  $[1 ; \infty[$   
 $f$  er aftagende i intervallet  $[-1 ; 1]$

**Opg. 906**

- a.  $f$  er aftagende i intervallet  $]-\infty ; 1]$   
 $f$  er voksende i intervallet  $[1 ; \infty[$   
Lokalt minimum:  $(1, 4)$

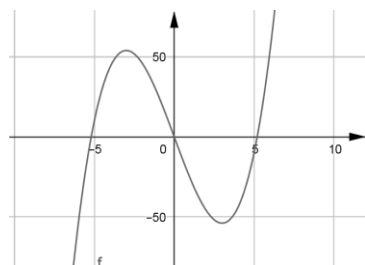
b.



**Opg. 907**

- a.  $f$  er voksende i intervallerne  $]-\infty ; -3]$  og  $[3 ; \infty[$   
 $f$  er aftagende i intervallet  $[-3 ; 3]$   
Lokalt maksimum:  $(-3, 54)$   
Lokalt minimum:  $(3, -54)$

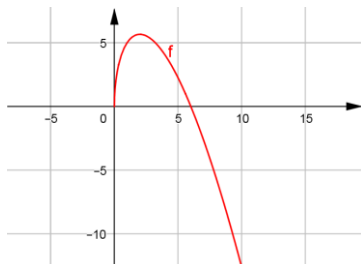
b.



**Opg. 908**

- a.  $f$  er voksende i intervallet  $]0 ; 2]$   
 $f$  er aftagende i intervallet  $[2 ; \infty[$   
Lokalt maksimum:  $(2; 5, 7)$

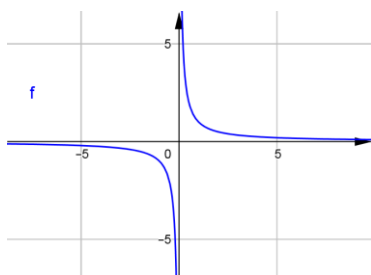
b.



**Opg. 909**

- a.  $f(x)$  er aftagende i intervallet  $] -\infty ; \infty[ , x \neq 0$

b.



**Opg. 910**

- a.  $f$  er aftagende i intervallet  $] -\infty ; 0]$   
 $f$  er voksende i intervallet  $[0 ; \infty[$

$$f'(x) = \frac{4x}{(x^2 + 2)^2}$$

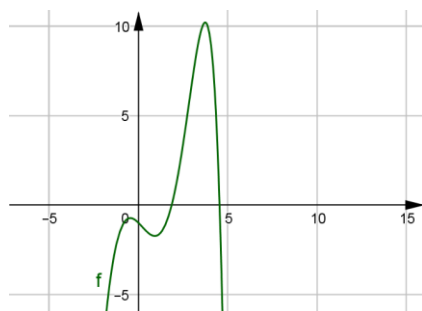
**Opg. 911**

- a.  $f$  er voksende i intervallerne  $]-\infty ; -0,46]$  og  $[0,91 ; 3,73[$   
 $f$  er aftagende i intervallerne  $]-0,46 ; 0,91]$  og  $[3,73 ; \infty[$

Lokale maksima:  $(-0,46; -0,73)$  og  $(3,71; 10,22)$

Lokalt minimum:  $(0,91; -1,73)$

b.



**Opg. 912**

- a.  $f$  er aftagende i intervallet  $]-\infty ; 0,69]$

$f$  er voksende i intervallet  $[0,69 ; \infty[$

Lokalt minimum:  $(0,69; 0,61)$

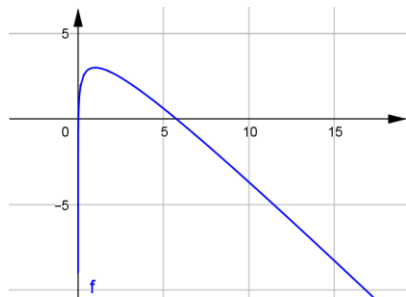
b.



**Opg. 913**

- a.  $f$  er voksende i intervallet  $[0 ; 1]$   
 $f$  er aftagende i intervallet  $[1 ; \infty[$   
Lokalt maksimum:  $(1,3)$

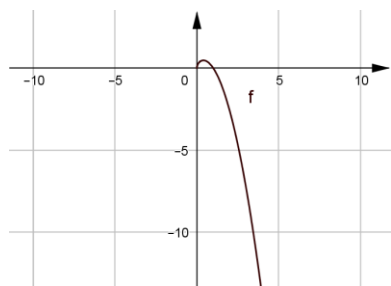
b.



**Opg. 914**

- a.  $f$  er voksende i intervallet  $[0 ; 0,4]$   
 $f$  er aftagende i intervallet  $[0,4 ; \infty[$   
Lokalt maksimum:  $(0,4;0,47)$

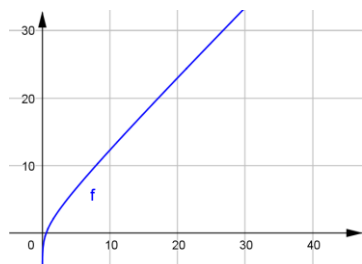
b.



**Opg. 915**

- a.  $f$  er voksende i intervallet  $]0; \infty[$   
Ingen maksima/minima

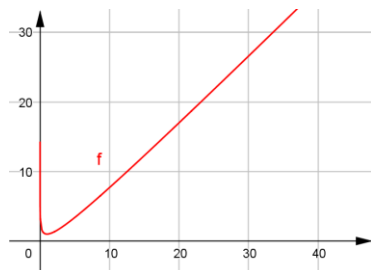
b.



**Opg. 916**

- a.  $f$  er aftagende i intervallet  $[0 ; 1]$   
 $f$  er voksende i intervallet  $[1 ; \infty[$   
Lokalt minimum:  $(1,1)$

b.

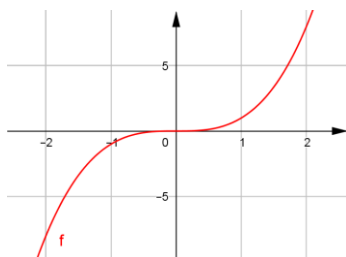


**Opg. 917**

- a.  $f$  er aftagende i intervallet  $]-\infty; \infty[ , x \neq 1$   
$$f'(x) = \frac{-1}{(x-1)^2} \quad \text{Ingen løsninger til } f'(x) = 0$$
- b.  $f$  er voksende i intervallet  $]-\infty; \infty[ , x \neq 0$   
$$f'(x) = \frac{x^2 + 1}{x^2} \quad \text{Ingen løsninger til } f'(x) = 0$$
- c.  $f$  er voksende i intervallet  $]-\infty; \infty[$   
$$f'(x) = \frac{1}{4 \cdot \left( \cosh\left(\frac{x}{2}\right) \right)^2} \quad \text{Ingen løsninger til } f'(x) = 0$$
- d.  $f$  er aftagende i intervallet  $]-\infty; \infty[ , x \neq 1$   
$$f'(x) = \frac{-1}{(x+1)^2} \quad \text{Ingen løsninger til } f'(x) = 0$$
- e.  $f$  er voksende i intervallet  $]-\infty ; 1]$   
 $f$  er aftagende i intervallet  $[1 ; \infty[$   
$$f'(x) = (2 - 2x) \cdot e^{-x} \quad f'(x) = 0 \rightarrow x = 1$$
- f.  $f$  er voksende i intervallet  $]-\infty ; e]$   
 $f$  er aftagende i intervallet  $[e ; \infty[$   
$$f'(x) = \frac{1}{x^2} - \frac{\ln(x)}{x^2} \quad f'(x) = 0 \rightarrow x = e$$

**Opg. 918**

a.



Da  $f'(x) = 0 \rightarrow x = 0$  og funktionen er voksende på begge sider af  $x = 0$  må funktionen have en vandret vendetangent i  $x = 0$

b.  $y = 0$

**Opg. 919**

b.  $x = -0,58$  og  $x = 0,58$

c. Lokalt maksimum:  $(-0,58; 0,39)$

Lokalt minimum:  $(0,58; -0,39)$

**Opg. 920**

a.  $f'(x) = 2x - 5$

b. 3

c. Ja ( $y = -0,25$ )

**Opg. 921**

a. 1 vandret tangent

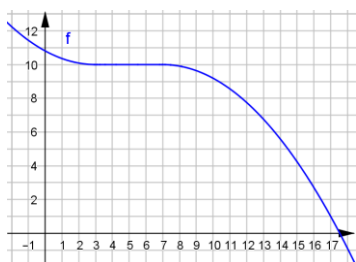
b.  $y = 3,2$

c. 3 vandrette tangenter

d.  $y = -0,25$  og  $y = 0$

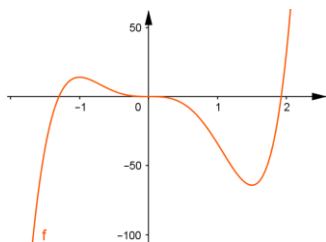
Opg. 922

a.



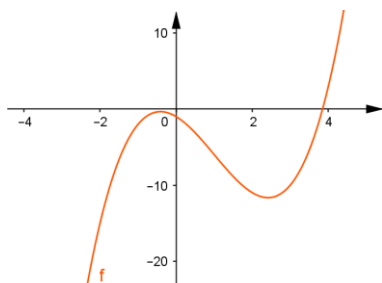
Opg. 923

- a.  $f$  er voksende i intervallerne  $]-\infty ; -1]$  og  $[1,5 ; \infty[$   
 $f$  er aftagende i intervallerne  $[-1 ; 0]$  og  $[0 ; 1,5]$   
Vandrette tangenter:  $y = 14$  ,  $y = 0$  ,  $y = -64,12$
- b.  $y = 0$
- c.



Opg. 924

- a.  $f$  er voksende i intervallerne  $]-\infty ; -0,41]$  og  $[2,41 ; \infty[$   
 $f$  er aftagende i intervallet  $[-0,41 ; 2,41]$   
Vandrette tangenter:  $y = -0,34$  ,  $y = -11,66$
- b. Ingen
- c.





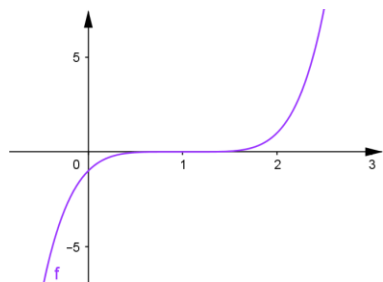
**Opg. 925**

a.  $f$  er voksende i intervallerne  $]-\infty ; 1]$  og  $[1 ; \infty[$

Vandret tangent:  $y = 0$

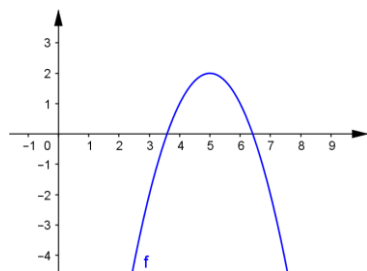
b.  $y = 0$

c.



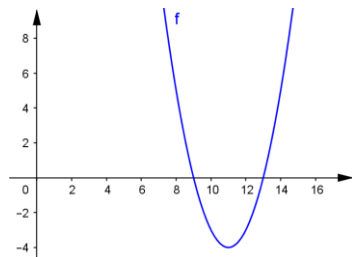
**Opg. 926**

a.



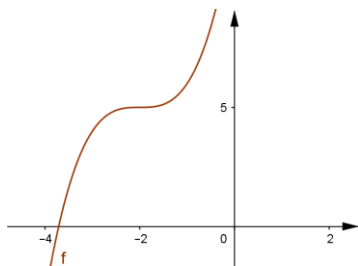
**Opg. 927**

a.



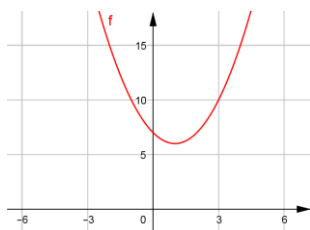
**Opg. 928**

a.



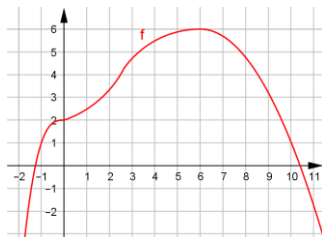
**Opg. 930**

a.



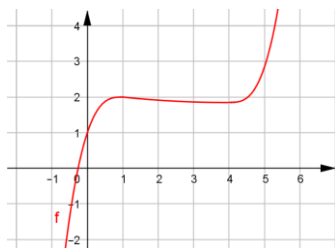
**Opg. 931**

a.



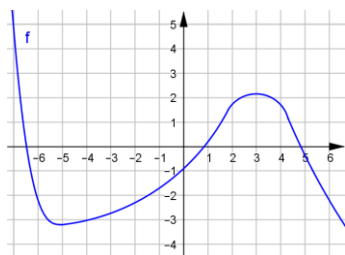
**Opg. 932**

a.



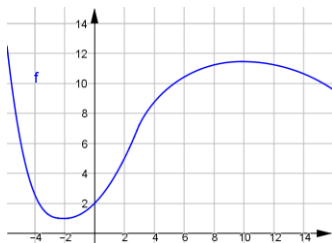
**Opg. 933**

a.



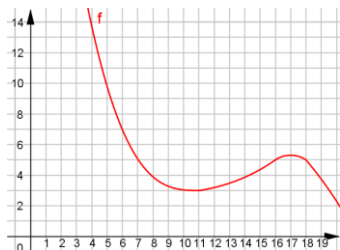
**Opg. 934**

a.



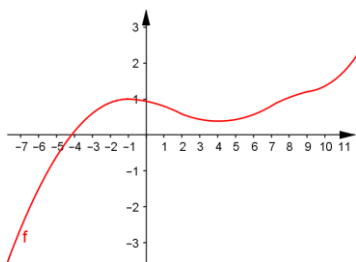
**Opg. 935**

a.



**Opg. 936**

a.



**Opg. 937**

- a.  $A$  er grafen for  $f'(x)$  ,  $B$  er grafen for  $f(x)$
- b.  $C$  er grafen for  $f(x)$  ,  $D$  er grafen for  $f'(x)$
- c.  $P$  er grafen for  $f(x)$  ,  $Q$  er grafen for  $f'(x)$
- d.  $M$  er grafen for  $f'(x)$  ,  $N$  er grafen for  $f(x)$
- e.  $R$  er grafen for  $f(x)$  ,  $S$  er grafen for  $f'(x)$
- f.  $A$  er grafen for  $f(x)$  ,  $B$  er grafen for  $f'(x)$

**Opg. 938**

- a.  $h(x) = \frac{100}{\pi \cdot x^2}$
- b.  $O(x) = 2 \cdot \pi \cdot x \cdot (h + x)$
- c.  $x = 2,5$  ,  $h = 5$

**Opg. 939**

- a.  $Pris_{Kasse} = 0,04(2x^2 + 4x^2 + 2 \cdot 2x \cdot h + 2 \cdot x \cdot h) = 0,24(x^2 + xh)$   
 $V_{Kasse} = 2 \cdot h \cdot x^2$
- b.  $V_{Kasse} = 2 \cdot \left( \frac{625}{x} - x \right) \cdot x^2$
- c.  $x = 20,4$  cm

**Opg. 940**

- a.  $x = 250/\pi$  m  $\approx 79,6$  m ,  $y = 0$  m

**Opg. 941**

- a.  $2,24$  m og  $1,12$  m

**Opg. 942**

- a.  $3$  m og  $2$  m

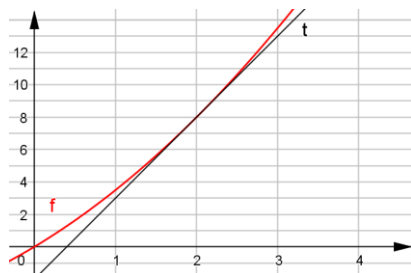
Opg. 943

a.  $x = 15,7$

Opg. 944

a.  $y = 5x - 2$

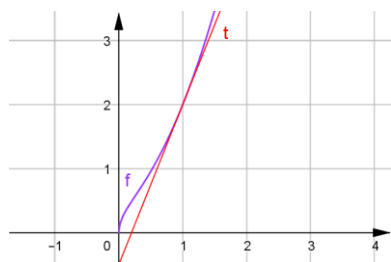
b.



Opg. 945

a.  $y = 2,5x - 0,5$

b.



Opg. 946

a.  $y = 2x + 6$

Opg. 947

a.  $y = -2x + 7$

b.  $y = x - 8$

c.  $y = 8x + 12$

Opg. 948

a.  $f(x) = 5x - 9$

**Opg. 949**

a.  $g(x) = -2x + 20$

**Opg. 950**

a.  $H(t) = 2t + 210$

**Opg. 951**

a.  $f(x) = e^{k \cdot x} \cdot c$

b.  $f(x) = e^{5x} \cdot 9$

**Opg. 952**

a.  $115 / \text{time}$

b.  $230 / \text{time}$

c. Eksponentiel vækst

d.  $N(t) = e^{0,023t} + 1000$