

Namn.....

Ämne.....

Betyg 

Datum..... Ark nr.....

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Klass.....

Inlämningslid.....

## LÖSNINGAR SLUTPROV HT-09

1.  $3x(x-5) = 0 \Rightarrow x_1 = 0 \quad x_2 = 5$

b)  $x(x^2 + x - 6) = 0 \Rightarrow x_1 = 0 \quad x_2 = 2 \quad x_3 = -3$

c)  $3x^5 = 48 \quad x^5 = 16 \quad x = \sqrt[5]{16}$

d)  $4^x = 7 \quad x = \lg 7 / \lg 4$   
 $x \approx 1,40$

2. a)  $f(2) = 3$       b)  $g(-2) = 2$

c)  $h(-1) = -3$

d.  $f(x) = 0 \Rightarrow x = -4$  ,  $g(x) = 0 \Rightarrow x_1 = -1,5$   
 $x_2 = 2,5$

 $h(x) = 0 \Rightarrow$  saknar lösning

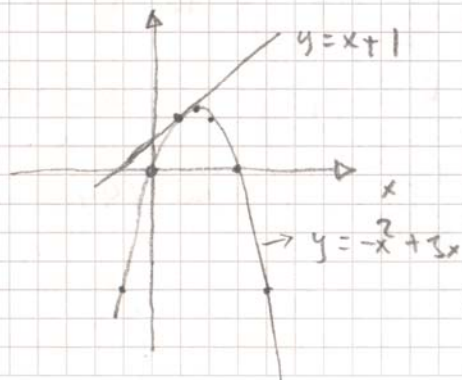
3.  $y = -x^2 + 3x \Rightarrow y' = -2x + 3$

$x = 1 \Rightarrow k = y'(1) = 1$

$y - y_1 = k(x - x_1) \Rightarrow y - 2 = 1 \cdot (x - 1)$

$y = x + 1$

b)  $y' = 0 \Rightarrow x = +1,5 \Rightarrow (+1,5; 2,25)$



$$4. \quad f(x) = 2x^3 + 3x^2 - 6x$$

$$f'(x) = 6x^2 + 6x - 6$$

$$f'(-1) = 6 - 6 - 6 = \underline{-6}$$

$$b) \quad f'(x) = 0 \Rightarrow \begin{cases} 6x^2 + 6x - 6 = 0 \\ x^2 + x - 1 = 0 \end{cases}$$

$$x = -0,5 \pm \sqrt{0,25 + 1}$$

$$x \approx -0,5 \pm 1,12$$

$$x_1 \approx 0,62$$

$$x_2 \approx -1,62$$

$$5. \quad y = 2 \cdot e^{3x} - e^{-3x}$$

$$y' = 6 \cdot e^{3x} + 3 \cdot e^{-3x}$$

$$f'(0) = 6 + 3 = 9$$

$$b. \quad a_n = 50 + (n-1) \cdot 5$$

$$a_{10} = 50 + 9 \cdot 5 = 95$$

$$a_1 = 50 \quad a_{15} = 50 + 14 \cdot 5 = 120$$

$$S_{15} = 15 \cdot \frac{(50+120)}{2} = 1275$$

$$b) \quad a = 250 \quad k = 1,04 \quad n = 20$$

$$S_{20} = \frac{250(1,04^{20} - 1)}{0,04} \approx 7444$$

$$7. f(x) = 2x^3 - 3x^2 - 12x$$


$$f'(x) = 6x^2 - 6x - 12$$

$$f'(x) = 0 \Rightarrow x^2 - x - 2 = 0$$

$$x_1 = -1$$

$$x_2 = +2$$

$\Rightarrow$  båda extremp. i intervallet

$f(x)$    $\Rightarrow$  max för  $x = -1$   
min för  $x = 2$

$$y_{\max} = f(-1) = 7$$

$$y_{\min} = f(2) = -20$$

$$f(-2) = -4 \quad f(3) = -9$$

Största värde: 7 när  $x = -1$

Minska värde: -20 när  $x = 2$

$$8. y = 3x^2 - x^3 - 4 = -(x-2)^2 \cdot (1+x)$$

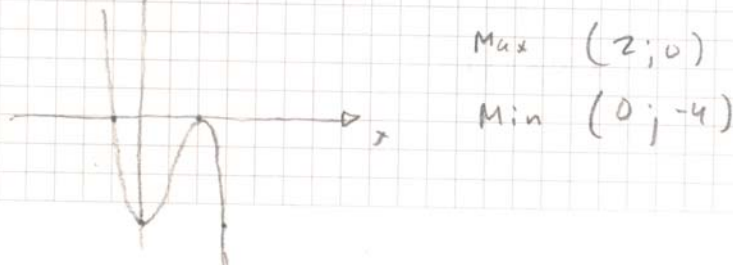
$$y = 0 \Rightarrow x = 2 \text{ (dubbelrot)} \quad x = -1$$

$$y' = 6x - 3x^2 = -3x(x-2)$$

$$y' = 0 \Rightarrow x_1 = 0 \quad x_2 = 2$$

$$y'' = 6 - 6x \quad y''(0) = 6 > 0 \Rightarrow \text{min}$$

$$\Delta y \quad y''(2) = -6 < 0 \Rightarrow \text{max}$$



9)  $f(x) : k = 0,15 \quad m = 2$   
 $\Rightarrow y = \underline{0,15x + 2}$

b)  $g(x) : y = +x^2 - x - 3,75$

c)  $h(x) : y = -x^2 - 2$

10.  $y = 200 - 180 \cdot e^{-0,011x}$

a)  $y(0) = 200 - 180 \cdot 1 = \underline{20^0}$

b)  $y = 200 - 180 \cdot e^{-0,011 \cdot 24} \approx \underline{62^0}$

c)  $y' = 180 \cdot 0,011 \cdot e^{-0,011x}$

$x = 24 \quad y' = 1,99 \cdot e^{-0,011 \cdot 24} \approx 1,5^0 / \text{min}$

d)  $72 = 200 - 180 \cdot e^{-0,011x}$

$$180 \cdot e^{-0,011x} = 128$$

$$e^{-0,011x} = 128/180$$

$$-0,011x = \ln(128/180)$$

$$x = \frac{\ln(128/180)}{-0,011}$$

$$x \approx 31$$

Svar: 31 min

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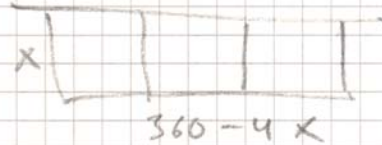
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11.



$$A = x(360 - 4x) = 360x - 4x^2$$

$$A' = 360 - 8x$$

$$A' = 0 \Rightarrow x = \frac{360}{8}$$

$$A'' = -8 < 0 \Rightarrow \text{max}$$

$$x = 45$$

Max area när  $x = 45$

Arean störst när hagen är  $45 \times 180$  m