Matematik B Onsdag 11/11 2015

- Fremmøderegistrering.
- Dagens knæbøjning.
- Nyt stof: Parablens toppunkt og symmetriakse.
  - BB>Supplerende noter>Parablens toppunkt mm. – beviser.
- Forskellige skrivemåder for $f'(x)$
- Opgaver:
  - BB>Eksamen>Skriftlig eksamen – hele opgavesæt>Juni 2014

OBS! Husk – ingen UV i matematik B på fredag 13/11

Opgave 5 (5 %)

En trekant ABC er givet ved: $b = 6$; $c = 4$ og $\angle A = 30°$.

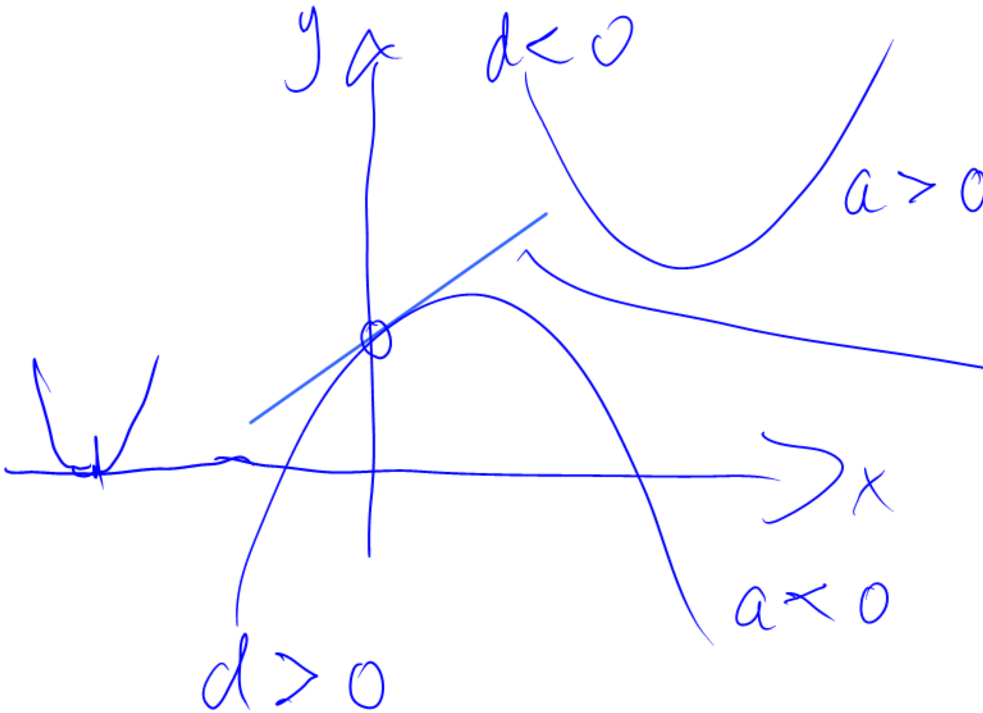
a) Beregn trekantens areal.

Reducer

$$\frac{\frac{13}{12}+\frac{11}{15}}{\frac{3}{5}}$$

6) Andengradspolynomier og parabler

Der ønskes en redegørelse for andengradspolynomier og deres grafer.
Specielt ønskes toppunktsformlen for en parabel udledt. Endvidere skal det vises at en parabel har en symmetriakse.



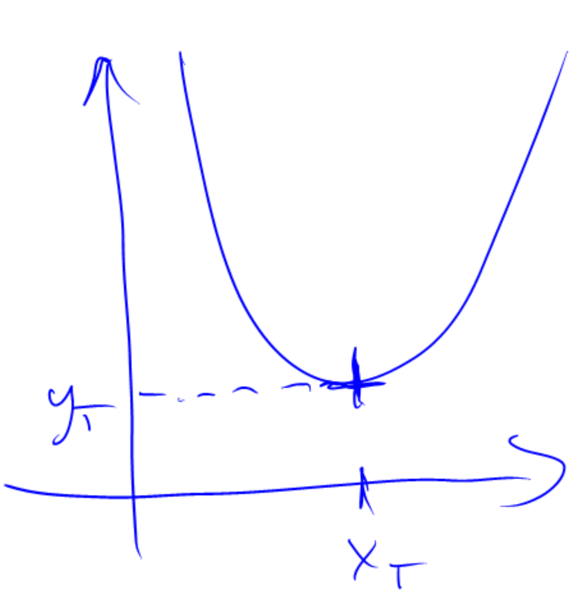
$f(x) = ax^2 + bx + c$

HÆLDNING FOR TANGENT I $(0, c)$

$f'(x) = 2ax + b$

$f'(0) = 2a \cdot 0 + b = b$

$d = b^2 - 4ac$



$$f'(x) = 0$$

$$2ax + b = 0$$

$$2ax = -b$$

$$x = -\frac{b}{2a}$$

$$\boxed{x_T = -\frac{b}{2a}}$$

$$y_T = f(x_T) = a x_T^2 + b x_T + c = a\left(-\frac{b}{2a}\right)^2 + b\left(-\frac{b}{2a}\right) + c$$

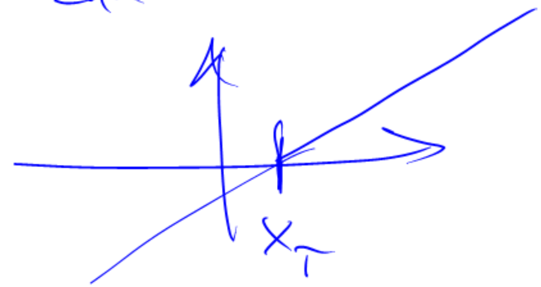
$$y_T = a \cdot \frac{b^2}{4a^2} - \frac{b^2}{2a} + c = \frac{b^2}{4a} - \frac{b^2}{2a} + c = \frac{b^2 - 2b^2}{4a} + \frac{4ac}{4a}$$

$$y_T = \frac{b^2 - 2b^2 + 4ac}{4a} = \frac{-b^2 + 4ac}{4a} = \frac{-(b^2 - 4ac)}{4a} = \frac{-d}{4a}$$

$$\boxed{y_T = -\frac{d}{4a}}$$

Function for $f'(x) = 2ax + b$

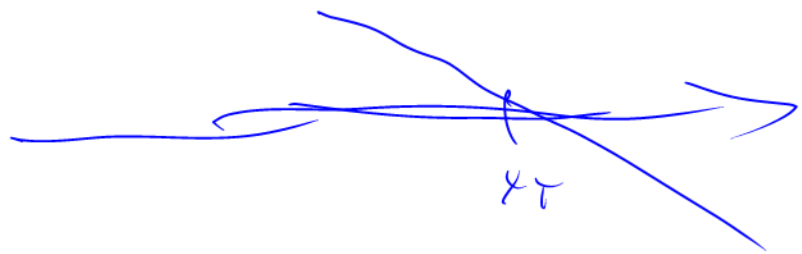
$a > 0$ $\quad y = ax + b$



$-$ $\quad 0 \quad$ $+$

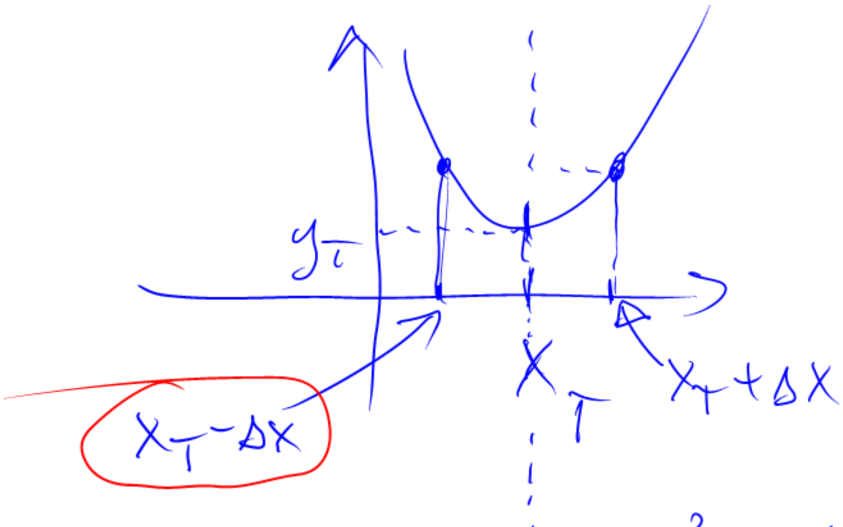
↘ $\quad$ → $\quad$ ↗

$a < 0$



$+$ $\quad 0 \quad$ $-$

↗ $\quad$ → $\quad$ ↘



$f(x_T) =$

$$f(x_T \pm \Delta x) = a\cdot(x_T \pm \Delta x)^2 + b(x_T \pm \Delta x) + c$$

$$= a\cdot(x_T^2 + \Delta x^2 \pm 2x_T\Delta x) + bx_T \pm b\Delta x + c$$

$$= ax_T^2 + a\Delta x^2 \pm a\cdot 2x_T\cdot\Delta x + bx_T \pm b\Delta x + c$$

$$= \underbrace{ax_T^2 + bx_T + c} + a\Delta x^2 \pm \Delta x\cdot(2ax_T + b)$$

$$= y_T + a\cdot\Delta x^2$$

$$2a\cdot\left(-\frac{b}{2a}\right) + b$$

$$-b + b = 0$$

$$(\Delta x \cdot 0 = 0)$$

$$f(x) = \frac{1}{2}x^2 + 4x - 5$$

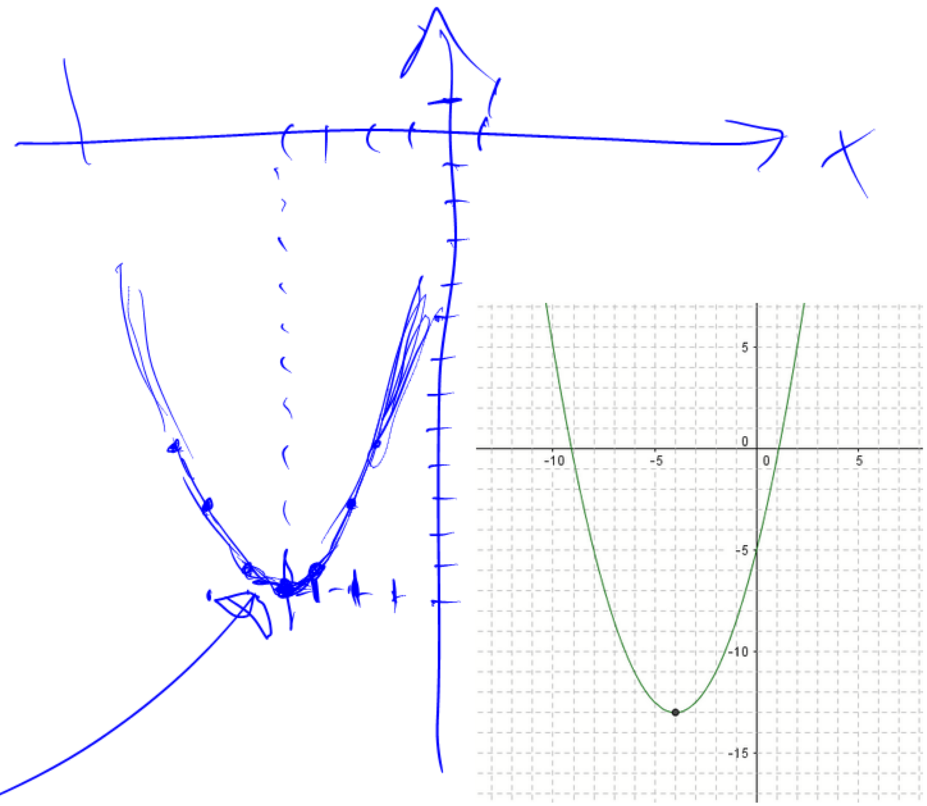
$$d = 4^2 - 4\cdot\frac{1}{2}\cdot(-5) = 16 + 10 = 26$$

$$x_T = -\frac{4}{2\cdot\frac{1}{2}} = -4$$

$$y_T = -\frac{26}{4\cdot\frac{1}{2}} = -13$$

$$(x_T, y_T) = (-4, -13)$$

$$\boxed{f(x_T + \Delta x) = y_T + \frac{1}{2}\cdot\Delta x^2}$$



Δx	x-tilvækst	$\Delta x = x - x_0$
$\Delta y, \Delta f$	funktionstilvækst for $y = f(x)$	$\Delta y = \Delta f = f(x) - f(x_0)$
$\dfrac{\Delta y}{\Delta x}, \dfrac{\Delta f}{\Delta x}$	differenskvotient for $y = f(x)$	$\dfrac{\Delta y}{\Delta x} = \dfrac{\Delta f}{\Delta x} = \dfrac{f(x) - f(x_0)}{x - x_0}$
$f'(x_0)$	differentialkvotienten for $y = f(x)$ i x_0	$f'(x_0) = \lim\limits_{x \to x_0} \dfrac{f(x) - f(x_0)}{x - x_0} = \lim\limits_{\Delta x \to 0} \dfrac{\Delta f}{\Delta x} = \lim\limits_{\Delta x \to 0} \dfrac{\Delta y}{\Delta x}$

Se også side 72 i B2

f'	afledet funktion af $y = f(x)$	betegnes $f'(x)$, y', $\frac{d}{dx}f(x)$, $\frac{d}{dx}(f(x))$, $\frac{df}{dx}$, $\frac{dy}{dx}$, $\left(\sqrt{3x^2+1}\right)'$
$f^{(n)}$	den n'te afledede funktion af $y = f(x)$	$f^{(2)}(x)$ skrives ofte $f''(x)$, y'' eller $\frac{d^2y}{dx^2}$