$$\int_1^{\infty} \underbrace{x^{-2a}}_{f(x)}\, dx = \lim_{b\to\infty} \left[\frac{1}{-2a+1}\, x^{-2a+1}\right]_1^b \qquad a \neq \frac{1}{2}$$

Hauptsatz:

$F(b) - F(a)$

$$x^n \xrightarrow{\text{aufleiten}} \frac{1}{n+1}\, x^{n+1}$$

$$= \lim_{b\to\infty} \left(\frac{1}{-2a+1} \cdot b^{-2a+1} - \frac{1}{-2a+1} \cdot \underbrace{1^{-2a+1}}_{=1} \right)$$

$$= \frac{1}{-2a+1} \lim_{b\to\infty} b^{-2a+1} - \frac{1}{-2a+1}$$

$$\lim_{b\to\infty} b^{-2a+1}$$ negativ?

Frage: Für welche n gibt es den Grenzwert

$$\lim_{x\to\infty} x^{n}$$ negativ

$$-2a+1 < 0 \quad | -1$$
$$-2a < -1 \quad | :(-2)$$
$$\underline{\underline{a > \frac{1}{2}}}$$

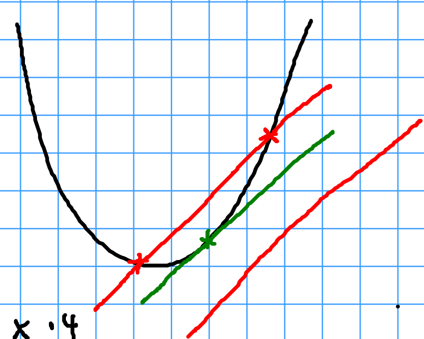
$$2^{-3} = \frac{1}{2^3}$$

$$\lim_{x\to\infty} x^{-2} = \lim_{x\to\infty} \frac{1}{x^2} = 0$$

Sonntag, 12. April 2020

$$\underline{y} = \frac{1}{4}x^2 + 1$$

b) $\underline{y} = x \qquad y = -x$



Gleichsetzen: $x = \frac{1}{4}x^2 + 1 \quad | -x \cdot 4$

$$0 = x^2 - 4x + 4$$
$$0 = (x-2)^2$$
$x = 2 \Rightarrow$ Tangente

$$-x = \frac{1}{4}x^2 + 1 \quad | +x \cdot 4$$
$$0 = x^2 + 4x + 4$$
$0 = (x+2)^2 \Rightarrow x = -2$

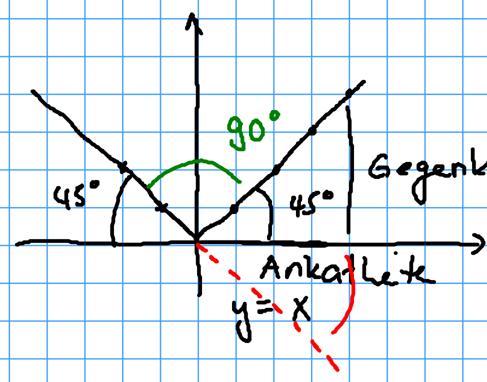
c) aus b) $x_1 = 2$ und $x_2 = -2$ Berührungspunkte

$y_1 = 2$ $\qquad$ $y_2 = -(-2) = 2$

$Q_1(2/2)$ $\qquad$ $Q_2(-2/2)$

d) $y = mx + q$ $\qquad$ $y = \overset{m=1}{x}$

$m_1 = 1$, $\qquad$ $m_2 = -1$



$\tan^{-1}(m_1) = \tan^{-1}(1) = 45°$

$\tan^{-1}(m_2) = \tan^{-1}(-1) = 135° \;/\; -45°$

$135° - 45° = 90°$

$45° - (-45°) = 90°$

e) $x^2 + y^2 - 8y + 8 = 0$

$x^2 + x^2 - 8x + 8 = 0$

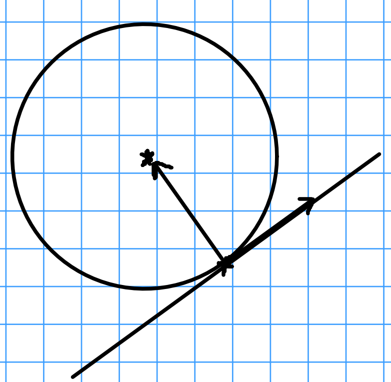
$2x^2 - 8x + 8 = 0 \quad |:2$

$x^2 - 4x + 4$

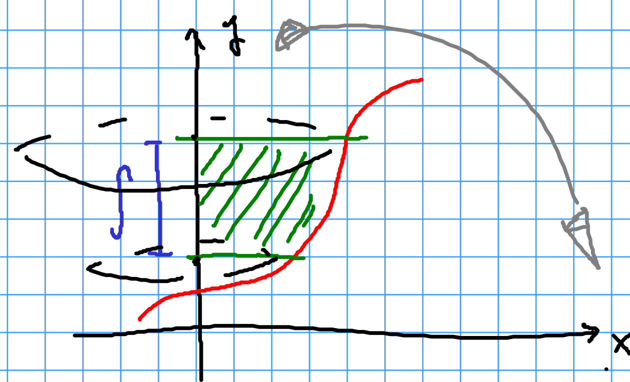
$(x-2)^2 = 0$

$x = 2$

$y = x \Rightarrow y = 2$



Aufgabe 5



c) $f(x) = e^{2x-2}$

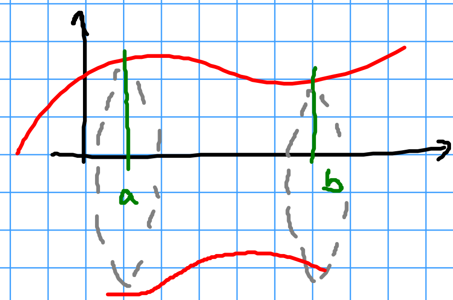
$y = e^{2x-2} \quad | \ln(\cdot)$

$\ln(y) = \ln(e^{2x-2})$

$\ln(y) = (2x-2)\cdot \underbrace{\ln(e)}_{=1} \quad | +2 \; :2$

$\frac{1}{2}\ln(y) + 2 = x$

$$V = \pi \int_a^b f(x)^2 \, dx$$



$$V = \pi \int_{f(0)}^{1} \left(\frac{1}{2} \ln(y) + 2 \right)^2 dy$$

$f(1) = 1$; e^{-2}

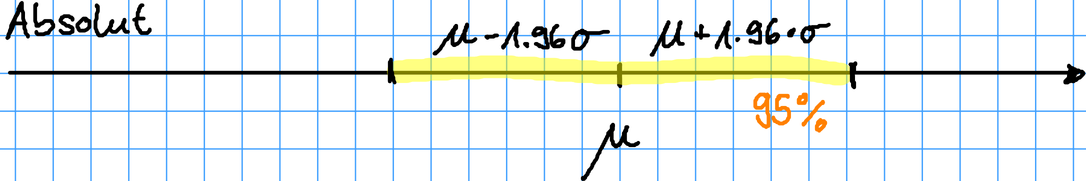
$$= \pi \int_{e^{-2}}^{1} \frac{1}{4} \ln(y)^2 + 2 \ln(y) + 4 \; dy \overset{TR}{=} \ldots$$

Aufgabe 4

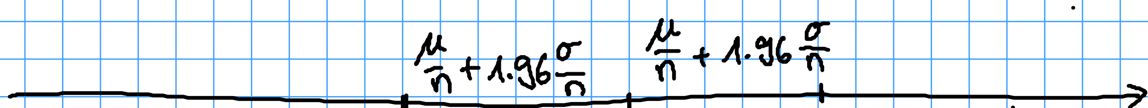
Vertrauensintervall: $p = \frac{81}{202}$ $\quad \mu = n \cdot p = \cancel{202} \cdot \frac{81}{\cancel{202}} = 81$

$$\sigma = \sqrt{n \cdot p \cdot q} = \sqrt{202 \cdot \frac{81}{202} \cdot \frac{121}{202}}$$

Absolut



W'keiten



$$\frac{\mu}{n} = p$$

Untere Grenze: $\frac{81}{202} - 1.96 \frac{\sqrt{202 \cdot \frac{81}{202} \cdot \frac{121}{202}}}{202} \approx 33.28\,\% = 0.3328$ 33.33 %

Obere Grenze: $\frac{81}{202} + 1.96 \frac{\sqrt{202 \cdot \frac{81}{202} \cdot \frac{121}{202}}}{202} \approx 46.91\,\% = 0.4691$