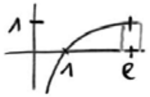
$g: x \rightarrow \frac{1}{x(1-\ln x)}$

1a D_g $x>0$; $x \neq 0$ $D_g: \mathbb{R}^+ \setminus \{e\}$
(7) $\ln x \neq 1 \Rightarrow e \neq x$

$\lim\limits_{x\to 0+} \frac{1}{\underset{0}{x}(\underbrace{1-\ln x}_{\infty})} = \infty$; $\lim\limits_{x\to\infty} \frac{1}{\underset{\infty}{x}(\underbrace{1-\ln x}_{-\infty})} = 0-$

$\lim\limits_{x\to e\mp} \frac{1}{\underset{e}{x}(\underbrace{1-\ln x}_{0\pm})} = \pm\infty$



1b $g' = \frac{0\cdot x(1-\ln x) - 1\cdot[(1-\ln x) + x\cdot(-\frac{1}{x})]}{[x(1-\ln x)]^2}$ $\left(\frac{u}{v}\right)' = \frac{u'v - v'u}{v^2}$
(7) $(uv)' = u'v + v'u$

$= \frac{1\cdot\ln x}{[x(1-\ln x)]^2} = [g(x)]^2 \cdot \ln x$

$g'(x) = \underbrace{[g(x)]^2}_{>0} \cdot \ln x$; $g' > 0$ für $\ln x > 0$
$\Rightarrow x > 1$ str. mo wa
$g' < 0$ für $\ln x < 0$
$\Rightarrow 0 < x < 1$ str. mo. fa

$\Rightarrow$ Min bei $x^E = 1$; $y^E = 1$

$h(x) = \frac{2}{x}$ $h'(x) = -\frac{2}{x^2}$

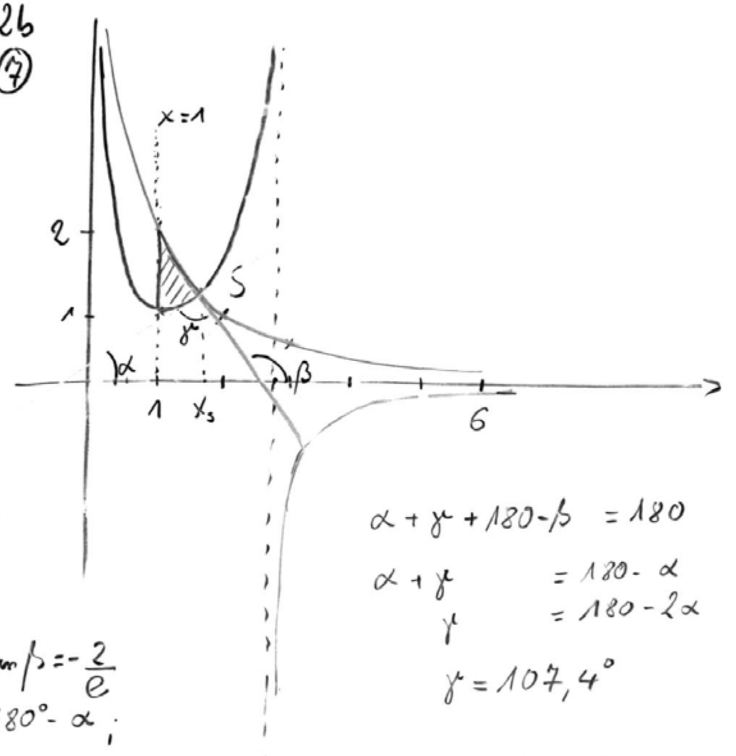
2a Schnittpkt der Funktionen g, h: $g = h$
(8) $\frac{1}{x(1-\ln x)} = \frac{2}{x} \Rightarrow x = 2x(1-\ln x)$

$x = 2x - 2x\ln x \Rightarrow 2x\ln x = x \mid : x \neq 0$

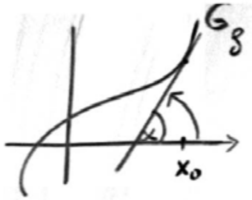
$2\ln x = 1/2$?? $\Rightarrow$ $\boxed{x_S = e^{\frac{1}{2}}}$ $\boxed{y_S = \frac{2}{e^{1/2}} = 2e^{-\frac{1}{2}}}$

$g'(e^{\frac{1}{2}}) = \tan\alpha = \left[\frac{1}{e^{\frac{1}{2}}\cdot\frac{1}{2}}\right]^2 \cdot \frac{1}{2} = \frac{2}{e}$; $h'(e^{\frac{1}{2}}) = \tan\beta = -\frac{2}{e}$
$\alpha = 36{,}3°$ ~~tan~~ $\beta = 180° - \alpha$;

2b
(7)



$\alpha + \gamma + 180 - \beta = 180$
$\alpha + \gamma = 180 - \alpha$
$\gamma = 180 - 2\alpha$
$\gamma = 107{,}4°$



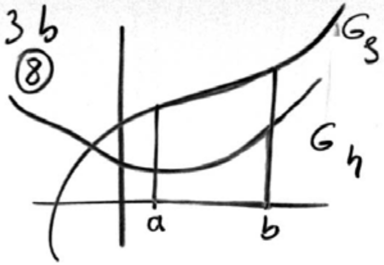
$g'(x_0) = \tan\alpha$

3a $F: x \rightarrow -\ln(1-\ln x)$
(3) Eine Fkt $F(x)$ ist Stammfkt zu einer Funktion $g(x)$ wenn gilt: $F'(x) = g(x)$

$\ln g(x)' = \frac{1}{g(x)} \cdot g'(x)$

$F' = -\frac{1}{1-\ln x} \cdot \left(-\frac{1}{x}\right) = \frac{1}{x(1-\ln x)} = g(x)$

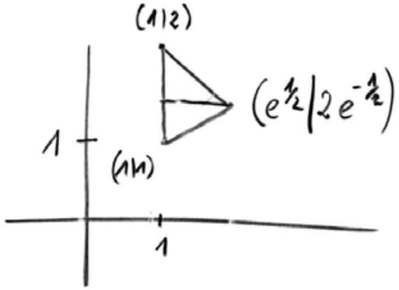
3b
(8)



Fläche zw. den beiden Graphen G_g u G_h zw. a u. b $= \int_a^b (g-h)\,dx$

$\int_1^{e^{1/2}} \left(\frac{2}{x} - \frac{1}{x(1-\ln x)}\right)dx = \left[2\ln x + \ln(1-\ln x)\right]_1^{e^{1/2}}$

$= \boxed{1 + \ln 1/2} - 0$



$F_\Delta = \frac{1}{2} \cdot 1 \cdot (e^{\frac{1}{2}} - 1)$

$\frac{\frac{1}{2}(e^{\frac{1}{2}} - 1) - (1 + \ln 1/2)}{1 + \ln 1/2} \cdot 100$ % 5,7%