$$y = x - \ln x$$

$$y' = 1 - \frac{1}{x} = \frac{x-1}{x}$$

$$y' = 1 - x^{-1}$$

$$y'' = 0 + 1 \cdot x^{-2}$$

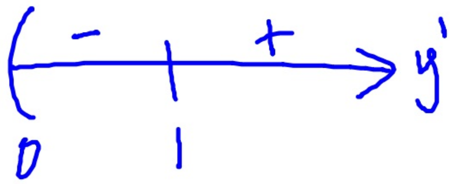
$$= 0 + \frac{1}{x^2}$$

$$y'' = \frac{1}{x^2}$$

No POI

POI

$D: (0, \infty)$



Rel. Min at (1,1) because
y' changes from negative
to positive at this point

$$\log 2^{x-4} = \log 11$$

$$(x-4)\log 2 = \log 11$$

$$x - \cancel{4} = \frac{\log 11}{\log 2} + 4$$

$$x = \frac{\log 11}{\log 2} + 4$$

$$x = \log_2 11 + 4$$

$e^{\ln x} = x$
$\ln e = 1$
$\ln 1 = 0$
$\ln e^{x} = x$
$\log 1 = 0$

$$\ln\sqrt{x-1} = 4$$

$$\frac{1}{2}\ln(x-1) = 4$$

$$e^{\ln(x-1)} = e^{8}$$

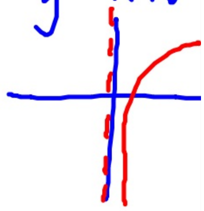
$$x - 1 = e^{8}$$

$$x = e^{8} + 1$$

11.) $f(x) = x(\ln x)^{1/2}$ $\quad (0, \infty)$

$$f'(x) = x \cdot \frac{1}{2}(\ln x)^{-1/2} \cdot \frac{1}{x} + (\ln x)^{1/2} \cdot 1$$

y = ln x



$$f'(x) = \frac{1}{2\sqrt{\ln x}} + \sqrt{\ln x}$$

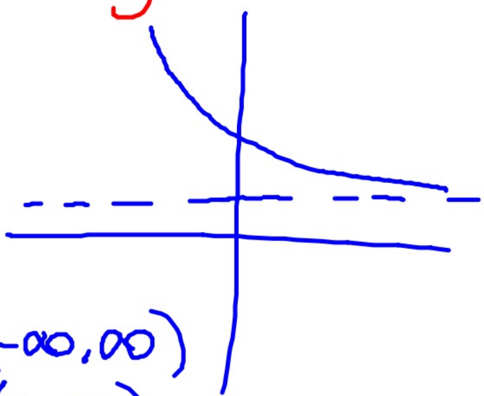
$$f'(x) = \frac{1 + 2\ln x}{2\sqrt{\ln x}}$$

$$0 = 1 + 2\ln x$$

$$e^{-\frac{1}{2}} = e^{\ln x}$$

$$e^{-1/2} = x$$

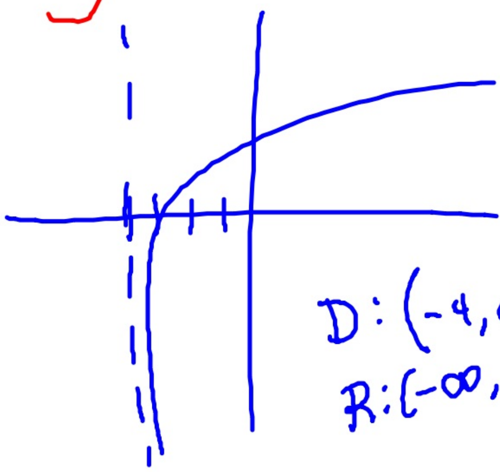
$y = e^{-x} + 1$



D: $(-\infty, \infty)$

R: $(1, \infty)$

$y = \ln(x+4)$



D: $(-4, \infty)$

R: $(-\infty, \infty)$

$$\int e^{5x}\,dx \qquad u = 5x,\quad du = 5\,dx,\quad \frac{du}{5} = dx$$

$$\frac{1}{5}e^{5x} + C$$

$$\frac{1}{5}\int e^{u}\,du$$

$$\frac{1}{5}e^{u} + C$$

$$\int_0^1 \frac{e^x}{e^x - 4}\,dx \qquad u = e^x - 4,\quad du = e^x$$

$$\int \frac{1}{u}\,du = \ln|e^x - 4|\Big]_0^1$$

$$= \ln|e^1 - 4| - \ln|1 - 4|$$

$$= \ln\frac{|e^1 - 4|}{3}$$

$$\int \frac{x^2+1}{x}\,dx$$

$$\int \left(x + \frac{1}{x}\right) dx$$

$$\frac{1}{2}x^2 + \ln|x| + C$$

$$\int \frac{x^2}{x}\,dx + \int \frac{1}{x}\,dx$$

$$\int \frac{x^2+4x-1}{x^1+5}\,dx$$

$$\begin{array}{r|rrr} -5 & 1 & 4 & -1 \\ & & -5 & 5 \\ \hline & 1 & -1 & 4 \end{array}$$

$$\int \left(x^1 - 1 + \frac{4}{x+5}\right) dX$$

$$\frac{1}{2}x^2 - x + 4\ln|x+5| + C$$

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

$$y = \frac{1}{2}\ln(x^2+1) - \ln(4x)$$

$$y' = \frac{1}{2} \cdot \frac{2x}{x^2+1} - \frac{4}{4x}$$

$$y' = \frac{x}{x^2+1} - \frac{1}{x}$$

$$y = \frac{e^{2x}}{x^2}$$

$$y' = \frac{x^2(2e^{2x}) - e^{2x} \cdot 2x}{x^4}$$

$$= \frac{2xe^{2x}(x-1)}{x^4} = \frac{2e^{2x}(x-1)}{x^3}$$

$$y = \sqrt{e^{4x}+1}$$

$$y' = \frac{1}{2}(e^{4x}+1)^{-1/2} \cdot 4e^{4x}$$

$$y' = \frac{2e^{4x}}{\sqrt{e^{4x}+1}}$$

$$y = \ln(x^2+x)^4$$

$$y = 4\ln(x^2+x)$$

$$y' = 4 \cdot \frac{2x+1}{x^2+x} = \frac{8x+4}{x^2+x}$$

$y = \sqrt{e^{4x} + 1}$

tan. line at $x = 0$

$(0, \sqrt{2})$ $m = \frac{2}{\sqrt{2}}$ $y - \sqrt{2} = \frac{2}{\sqrt{2}}(x - 0)$

$y' = \frac{2e^{4x}}{\sqrt{e^{4x} + 1}}$

$y'(0) = \frac{2}{\sqrt{2}}$

$$\int e^{\sin 2x} \cos 2x \, dx = \frac{1}{2}\int e^{u} \, du$$

$u = \sin 2x$

$du = 2\cos 2x \, dx$

$$= \frac{1}{2} e^{u} + C$$

$$= \frac{1}{2} e^{\sin 2x} + C$$

Solve the differential equation

$$\int \frac{dy}{\cancel{dx}} = \int \tan 4x \, dx \qquad (0, 2)$$

$u = 4x$

$du = 4dx$

$$y = \frac{1}{4}\int \tan u \, du$$

$$y = \frac{1}{4}\left(-\ln|\cos u|\right) + C$$

$$y = -\frac{1}{4}\ln|\cos 4x| + C$$

$$2 = 0 + C$$

$$2 = C$$

Find the original function.

$$\boxed{y = -\frac{1}{4}\ln|\cos 4x| + 2}$$

$y = e^x, \ x = 1, \ y = 0, \ x = 4$

$$\int_1^4 e^x dx = e^x \Big]_1^4$$

$$= e^4 - e^1$$