By the substitution $u=-t$, we get

$$du = u'dt = -dt$$

$$dt = -du$$

t	-1	x
u	1	$-x$

$$\int_{-1}^{x} \frac{1}{t}\,dt = \int_{1}^{-x} \frac{1}{-u}(-du) = \int_{1}^{-x} \frac{du}{u} = \ln(-x)$$

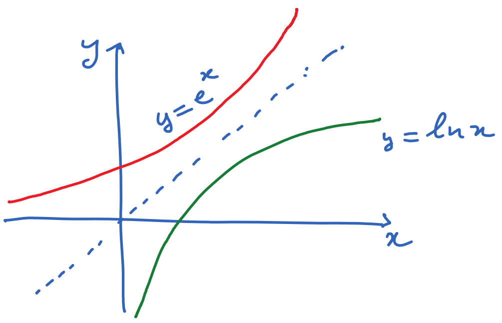
Therefore, $f(x) = \ln(-x) = \ln|x|$.

$$\boxed{\int \frac{1}{x}\,dx = \ln|x| + C}$$

Exponential funtions:

when $x>0$, $(\ln x)' = \frac{1}{x} > 0$.

Thus, $\ln x$ is an increasing function. It has an inverse function, which we call the exponential function e^x.



$$e^{\ln x} = x$$

$$\ln(e^x) = x$$

Challenge (5 points worth, to be turned in next Tuesday)

Does the curve $y=\ln x$ intersect the line $y=x$? Explain your answer.