11.2 #22

Area enclosed by y-axis and

$x = t - t^2$, $y = 1 + e^{-t}$

$$\int_a^b y\,dx \quad \text{OR} \quad \int_a^b x\,dy$$

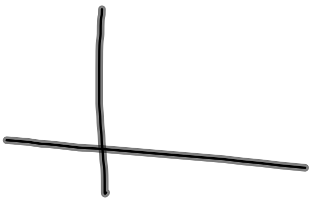
$$y - 1 = e^{-t}$$

$$\ln(y-1) = -t$$

$$t = -\ln(y-1)$$

$$x = -\ln(y-1) - (\ln(y-1))^2$$

$$x = \ln\left(\frac{1}{y-1}\right) - (\ln(y-1))^2$$



$$y = \ln\left(\frac{1}{x-1}\right) - (\ln(x-1))^2$$

$$= -\ln(x-1) - (\ln(x-1))^2 \qquad \ln(x-1)^2$$

New

$$\boxed{= -\ln(x-1)\left[1 - \ln(x-1)\right] \overset{\text{SET}}{=} 0 \Longrightarrow}$$

$-\ln(x-1) = 0$

$x-1 = e^0$

$x = 1+1 = 2$

$\boxed{\begin{aligned} \ln(x-1) &= 1 \rightarrow -1 \rightarrow x= \\ x-1 &= e \rightarrow \tfrac{1}{e} \\ x &= e+1 \rightarrow \tfrac{1}{e}+1 \end{aligned}}$

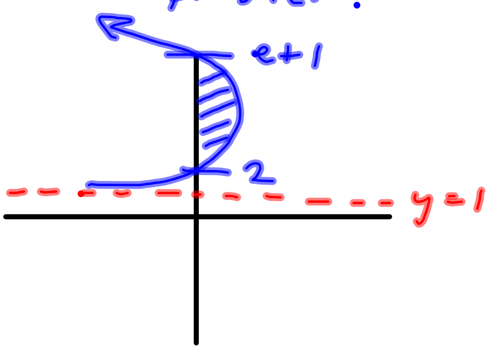
$\ln(100) - (\ln(99))^2$

$$\boxed{\int_2^{e+1} y\,dx} = \int_2^{e+1} x\,dy$$ which version?

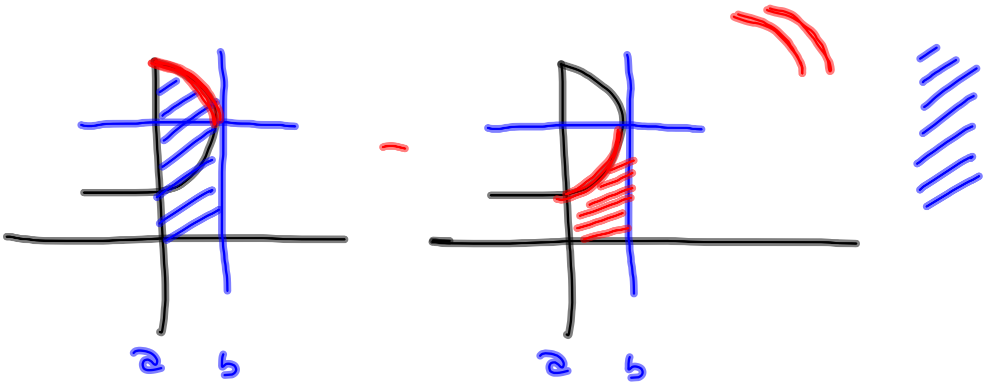
I use my change of variables,
because I'm stupid about $x=g(y)$ stuff

Now that I've analyzed it, for limits
of integration, I'll change back:

$$\int_2^{e+1} x\,dy$$



2, $y = 1+e^{-t}$



Ow!

No way I do it this way! = 

$x = -\ln(y-1) - (\ln(y-1))^2$

$e^x = e^{\ln\left(\frac{1}{y-1}\right) - (\ln(y-1))^2}$

$e^x = \frac{1}{y-1} e^{-(\ln(y-1))^2}$ $\qquad (a^b)^c = a^{bc}$

$= \frac{1}{y-1} \cdot \frac{1}{e^{(\ln(y-1))^2}}$ $\qquad a^{b^c}$

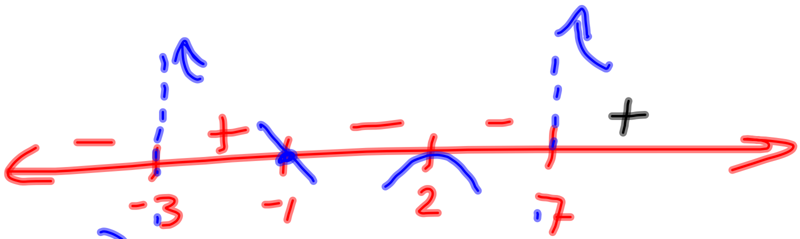
$\cancel{= \frac{1}{y-1} \cdot e^{\frac{1}{2}\ln(}}$

$e^{\ln(y-1)\ln(y-1)}$

$= \left(e^{\ln(y-1)}\right)^{\ln(y-1)}$

$= (y-1)^{\ln(y-1)}$

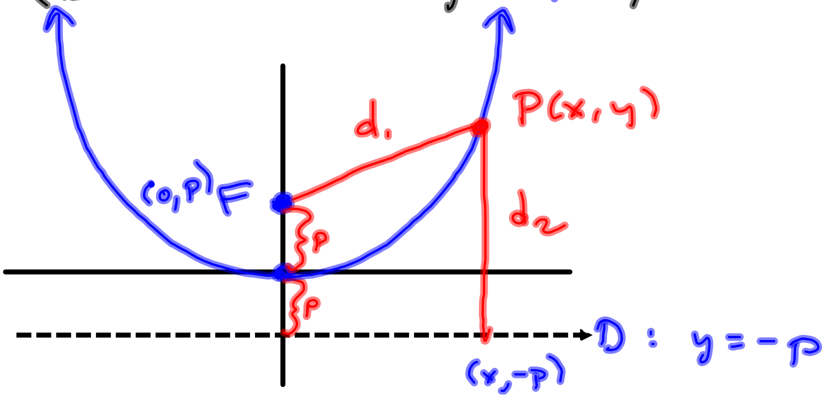
$$\frac{(x-2)^2(x+1)^1}{(x+3)^1(x-7)^1} \geq 0$$



$$(x-2)^2(x+1)(x+3)(x-7)$$

$\ln x$ is monotone increasing func.

Parabola - set of points equidistant from a point (Focus: $F = (0, p)$) and a line (Directrix: D: $y = -p$)



$$d_1 = d_2$$

$$\sqrt{(x-0)^2 + (y-p)^2} = \sqrt{(x-x)^2 + (y-(-p))^2}$$

$$x^2 + y^2 - 2py + p^2 = y^2 + 2yp + p^2$$

$-4py = -x^2$

$y = \frac{x^2}{4p}$ where p = distance from vertex to focus/directrix.

$$\boxed{y = 5x^2 = \frac{x^2}{\frac{1}{5}}}$$

$\frac{1}{5} = 4p \qquad p = \frac{1}{20}$

$y = x^2$

$y = (x+3)^2 - 20$

$y = x^2 + 6x - 11$

$= x^2 + 6x + 3^2 - 9 - 11$

$= \underbrace{(x+3)^2}_{1} - 20$

$4p = 1$

$p = \frac{1}{4}$

4p under the squared term.

$y = 7x^2 - 11x + 23$

$y = 7\left(x^2 - \frac{11}{7}x + \left(\frac{11}{14}\right)^2\right) + 23 - 7\left(\frac{121}{196}\right)$

$= 7\left(x - \frac{11}{14}\right)^2 + \frac{523}{28}$

$= \dfrac{\left(x - \frac{11}{14}\right)^2}{\frac{1}{7}} + \frac{523}{28}$

$4a = \frac{1}{7}$

$a = \frac{1}{28}$

$\begin{array}{r} 28 \\ 23 \\ \hline 84 \end{array}$

$= -121\,6\cancel{44}56 = 280$

$\frac{-121}{28} + \frac{7(23)(28)}{28}$

$\frac{523}{28}$

$=$