a) Find $\int \frac{e^x}{1+e^x}\,dx$

$u = 1 + e^x$

$\frac{du}{dx} = e^x$

$du = e^x\,dx$

$= \int \frac{du}{u}$

$= \int \frac{1}{u}\,du$

$= \ln|u| + C$

$= \ln|1+e^x| + C$

b) Show that $\int_{\frac{\pi^2}{4}}^{\pi^2} \frac{\cos\sqrt{x}}{\sqrt{x}}\,dx = -2$

$\int_{x=\frac{\pi^2}{4}}^{x=\pi^2} \frac{\cos\sqrt{x}}{\sqrt{x}}\,dx$

$u = \sqrt{x}$

$u = x^{\frac{1}{2}}$

$\frac{du}{dx} = \frac{1}{2}x^{-\frac{1}{2}}$

$\frac{du}{dx} = \frac{1}{2}\cdot\frac{1}{\sqrt{x}}$

$2\,du = \frac{1}{\sqrt{x}}\,dx$

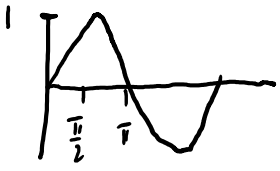
$= \int_{u=\frac{\pi}{2}}^{u=\pi} 2\cos u\,du$

$= \left[2\sin u\right]_{\frac{\pi}{2}}^{\pi}$

$= 2\sin\pi - 2\sin\frac{\pi}{2}$

$= 0 - 2$

$= -2$



$\sin\pi = 0$

$\sin\frac{\pi}{2} = 1$