Let,

$u = e^{-x}$

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

$e^{-x}\,dx = -du$

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

$x = \ln\left(\frac{2}{\sqrt{3}}\right);\ u = e^{-\ln(2/\sqrt{3})} = \frac{\sqrt{3}}{2}$

$= -\int_{1/2}^{\sqrt{3}/2} \frac{1}{\sqrt{1-u^2}}\,du$

$= -\left[\sin^{-1} u\right]_{\frac{1}{2}}^{\sqrt{3}/2}$

$= -\left[\sin^{-1}\frac{\sqrt{3}}{2} - \sin^{-1}\frac{1}{2}\right]$

$= \ldots\ldots$

$= \ldots\ldots$

v) $\int_1^3 \frac{x+2}{\sqrt{x^2+4x+7}}\,dx$

Let,

$u = x^2 + 4x + 7$

$\frac{du}{dx} = 2x+4 = 2(x+2)$

$(x+2)\,dx = \frac{1}{2}\,du$

$x = 1\ ;\ u = 1^2 + 4\cdot 1 + 7$

$= 12$

$x = 3\ ;\ u = 3^2 + 4\cdot 3 + 7$

$= 9 + 12 + 7$

$= 28$

$$\frac{1}{2}\int_{12}^{28} \frac{1}{\sqrt{u}}\, du$$

$$= \frac{1}{2}\int_{12}^{28} u^{-\frac{1}{2}}\, du$$

$$= \frac{1}{2}\left[\frac{u^{\frac{1}{2}}}{\frac{1}{2}}\right]_{12}^{28}$$

$$= \frac{1}{2}\left[2u^{\frac{1}{2}}\right]_{12}^{28}$$

$$= \left[u^{\frac{1}{2}}\right]_{12}^{28}$$

$$= \sqrt{28} - \sqrt{12}$$

Ans

⊛ $$\int_{-1}^{1} \sqrt{2+|x|}\, dx$$

$$= \int_{-1}^{0} \sqrt{2-x}\, dx + \int_{0}^{1} \sqrt{2+x}\, dx$$

⊛ $$\int_{-1}^{1} |e^x - 1|\, dx$$

$$= \int_{-1}^{0} -(e^x-1)\, dx + \int_{0}^{1} (e^x-1)\, dx$$

END