1. $\int \frac{1}{\left(1-x^2\right)\sqrt{1+x^2}}dx$**.**

Putting $x = \frac{1}{t}$ and $dx = -\frac{1}{t^2}dt$, we get

$$I = \int \frac{\left(-\frac{1}{t^2}\right)dt}{\left(1-\frac{1}{t^2}\right)\sqrt{1+\frac{1}{t^2}}} = -\int \frac{tdt}{\left(t^2-1\right)\sqrt{t^2+1}}$$

Let $r^2 + I = u^2$, or $2tdt = 2udu$

$$\therefore I = -\int \frac{du}{u^2-(\sqrt{2})^2}$$

$$= -\frac{1}{2\sqrt{2}}\log\left|\frac{u-\sqrt{2}}{u+\sqrt{2}}\right| + C$$

$$= -\frac{1}{2\sqrt{2}}\log\left|\frac{\sqrt{t^2+1}-\sqrt{2}}{\sqrt{t^2+1}+\sqrt{2}}\right| + C$$