

Weird usub

$$\int \frac{x}{\sqrt{1+x}} dx$$

$$\text{let } u = 1 + x$$

$$du = dx$$

$$= \int \frac{u-1}{\sqrt{u}} du \quad u-1 = x$$

$$= \int [u^{\frac{1}{2}} - u^{-\frac{1}{2}}] du$$

$$= \frac{2}{3} u^{\frac{3}{2}} - 2 u^{\frac{1}{2}} + C$$

$$= \frac{2}{3} (1+x)^{\frac{3}{2}} - 2\sqrt{1+x} + C$$

$$\int x\sqrt{1-x} dx$$

$$\text{let } u = 1 - x$$

$$du = -dx$$

$$= -\int (1-u)\sqrt{u} du \quad -du = dx$$

$$x = 1 - u$$

$$= -\int [u^{\frac{1}{2}} - u^{\frac{3}{2}}] du$$

$$= -\left[\frac{2}{3}u^{\frac{3}{2}} - \frac{2}{5}u^{\frac{5}{2}}\right] + C$$

$$= -\left[\frac{2}{3}(1-x)^{\frac{3}{2}} - \frac{2}{5}(1-x)^{\frac{5}{2}}\right] + C$$