(b) $r^2 \frac{dr}{d\varnothing} = \sin \varnothing$

الحل :

$$r^2\, dr = \sin \varnothing\, d\varnothing$$

$$\int r^2 dr = \int \sin \varnothing\, d\varnothing$$

$$\frac{r^3}{3} = -\cos \varnothing + c_1$$

$$\Rightarrow r^3 = 3(-\cos \varnothing + c_1)$$

$$r^3 = -3\cos \varnothing + 3c_1$$

$$r^3 = -3\cos \varnothing + c \quad , \quad c = 3c_1$$

(c) $(1-x)\,dy = (1+y)\,dx$

$$\frac{1}{1+y}\,dy = \frac{1}{1-x}\,dx$$

$$\Rightarrow \int \frac{1}{1+y}\,dy = \int \frac{1}{1-x}\,dx$$

$$\Rightarrow \text{Ln}(1+y) = -\text{Ln}(1-x) + c$$

$$\Rightarrow \text{Ln}(1+y) + \text{Ln}(1-x) = \text{Ln}\, e^c$$

$$\Rightarrow \text{Ln}(1+y)(1-x) = \text{Ln}\, e^c$$

$$\Rightarrow (1+y)(1-x) = e^c$$

$$\Rightarrow 1 + y = \frac{e^c}{1-x}$$

$$\Rightarrow y = \frac{e^c}{1-x} - 1$$

(d) $\frac{dy}{dx} = -\sqrt{\frac{1-y^2}{1-x^2}}$