السؤال الأول (1)

$$F(x) = \sin x - x\cos x + c$$

$$F'(x) = \cos x - \cos x + x\sin x$$

$$F'(x) = x\sin x = f(x)$$

السؤال الأول (2)

$$F(x) = x(lnx)^2 - 2x(lnx) + 2x + c$$

$$F'(x) = \frac{2x(lnx)}{x} + (lnx)^2 - 2(lnx) - \frac{2x}{x} + 2$$

$$F'(x) = 2(lnx) - 2(lnx) - 2 + 2 + (lnx)^2$$

$$F'(x) = (lnx)^2 = f(x)$$

السؤال الثاني (1)

$$\frac{dy}{dx} = \sec^2 x + 2x(\sec x)(\sec x\tan x)$$

$$\frac{dy}{dx} = \sec^2 x + 2x(\sec^2 x)(\tan x)$$

السؤال الثاني (2)

$$\int \frac{dy}{dx}dx = \int sec^2x\,dx + 2\int x(\sec^2 x)(\tan x)\,dx$$

$$\int x(\sec^2 x)(\tan x)\,dx = \frac{\int \frac{dy}{dx}dx - \int sec^2x\,dx}{2}$$

$$\int x(\sec^2 x)(\tan x)\,dx = \frac{y - \tan x}{2} + c$$

$$\int x(\sec^2 x)(\tan x)\,dx = \frac{x(\sec^2 x) - \tan x}{2} + c$$

السؤال الثالث (1)

$$\frac{dy}{dx} = \frac{\sec x\tan x + \sec^2 x}{\sec x + \tan x} = \frac{\sec x\,(\tan x + \sec x)}{\tan x + \sec x} = \sec x$$

السؤال الثالث (2)

$$\int \sec x\ dx = \int \frac{dy}{dx}dx = \int dy = y + c = \ln|\sec x + \tan x| + c$$