$\Rightarrow y + 1 = 3e^{\frac{x^2-1}{4}}$

$\Rightarrow y = 3e^{\frac{x^2-1}{4}} - 1$ ...let $x = 2$

$\Rightarrow y = 3e^{\frac{3}{4}} - 1$

$\Rightarrow y = 5.35$

Q. 17. $x\frac{dy}{dx} = \sqrt{4-y^2}$

$\Rightarrow \frac{1}{\sqrt{4-y^2}}dy = \frac{1}{x}dx$

$\Rightarrow \int_0^y \frac{1}{\sqrt{4-y^2}}dy = \int_1^x \frac{1}{x}dx$

$\Rightarrow \sin^{-1}\frac{y}{2}\Big|_0^y = \log_e x\Big|_1^x$

$\Rightarrow \sin^{-1}\frac{y}{2} - \sin^{-1}0 = \log_e x - \log_e 1$

$\Rightarrow \sin^{-1}\frac{y}{2} = \log_e x$

$\Rightarrow \frac{y}{2} = \sin(\log_e x)$

$\Rightarrow y = 2\sin(\log_e x)$

...general solution

Let $x = \sqrt[3]{e^{\frac{\pi}{2}}}$

$\Rightarrow y = 2\sin\left(\log_e \sqrt[3]{e^{\frac{\pi}{2}}}\right)$

$\Rightarrow y = 2\sin\left(\frac{\pi}{6}\log_e e\right)$

$\Rightarrow y = 2\sin\frac{\pi}{6}$

$\Rightarrow y = 2\left(\frac{1}{2}\right)$

$\Rightarrow y = 1$

Exercise 12F

Q. 1. $\frac{d^2y}{dx^2} = 2\frac{dy}{dx}$

$\Rightarrow \frac{dv}{dx} = 2v$, where $v = \frac{dy}{dx}$

$\Rightarrow \int_1^v \frac{dv}{v} = \int_0^x 2\,dx$

$\Rightarrow \log_e v\Big|_1^v = 2x\Big|_0^x$

$\Rightarrow \log_e v - \log_e 1 = 2x - 2(0)$

...$\log_e 1 = 0$

$\Rightarrow \log_e v = 2x$

$\Rightarrow v = e^{2x}$ ...End of Step 1

$\Rightarrow \frac{dy}{dx} = e^{2x}$

$\Rightarrow \int_0^y dy = \int_0^x e^{2x}\,dx$

$\Rightarrow y\Big|_0^y = \frac{1}{2}e^{2x}\Big|_0^x$

$\Rightarrow y - 0 = \frac{1}{2}[e^{2x} - e^0]$

$\Rightarrow y = \frac{1}{2}[e^{2x} - 1]$

Q. 2. $\dfrac{\frac{d^2y}{dt^2}}{\left(\frac{dx}{dt}\right)^2}$

$\Rightarrow \frac{dv}{dt} = v^2$, where $v = \frac{dx}{dt}$

$\Rightarrow \int_1^v \frac{dv}{v^2} = \int_0^t dt$

$\Rightarrow -\frac{1}{v}\Big|_1^v = t\Big|_0^t$

$\Rightarrow -\frac{1}{v} - (-1) = t - 0$

$\Rightarrow 1 - \frac{1}{v} = t$

$\Rightarrow \frac{1}{v} = 1 - t$

$\Rightarrow v = \frac{1}{1-t}$ ...End of Step 1

$\Rightarrow \frac{dx}{dt} = \frac{1}{1-t}$

$\Rightarrow \int_0^x dx = \int_0^t \frac{dt}{1-t}$

$\Rightarrow x\Big|_0^x = -\log_e(1-t)\Big|_0^t$

$\Rightarrow x - 0 = -\log_e(1-t) - (-\log_e 1)$

...$\log_e 1 = 0$

$\Rightarrow x = \log_e(1-t)^{-1}$

$\Rightarrow x = \log_e\left(\frac{1}{1-t}\right)$

Q. 3. $\frac{d^2s}{dt^2} = 6$

$\Rightarrow \frac{dv}{dt} = 6$, where $v = \frac{ds}{dt}$

$\Rightarrow \int_4^v dv = \int_0^t 6\,dt$

$\Rightarrow v\Big|_4^v = 6t\Big|_0^t$

$\Rightarrow v - 4 = 6t$

$\Rightarrow v = 6t + 4$ ...End of Step 1

$\Rightarrow \frac{ds}{dt} = 6t + 4$

$\Rightarrow \int_0^s ds = \int_0^t (6t+4)dt$

$\Rightarrow s\Big|_0^s = (3t^2 + 4t)\Big|_0^t$

$\Rightarrow s = 3t^2 + 4t$