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Subject:

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BR

$$\begin{aligned} \text{b) } \int \frac{(t+1)^2}{2t^3} dt &= \int \frac{t^2 + 2t + 1}{2t^3} dt = \int \left(\frac{t^2}{2t^3} + \frac{2t}{2t^3} + \frac{1}{2t^3} \right) dt \\ &= \frac{1}{2} \int \frac{1}{t} dt + \int \frac{1}{t^2} dt + \frac{1}{2} \int \frac{1}{t^3} dt \\ &= \frac{1}{2} \ln|t| - \frac{1}{t} + \frac{1}{2} \cdot \left(\frac{1}{2} \right) \frac{1}{t^2} + C \\ &= \frac{1}{2} \ln|t| - \frac{1}{t} - \frac{1}{4t^2} + C \end{aligned}$$

Antiderivative

* ALWAYS REMEMBER TO ADD C *

① $\int \sin x dx$

Recall: $\frac{d}{dx} \cos x = -\sin x$
 $\Rightarrow -\frac{d}{dx} \cos x = \sin x$

So $\int \sin x dx = -\cos x + C$

② $\int \cos x dx = \sin x + C$

④ $\int \sqrt{x} dx = \int x^{\frac{1}{2}} dx = \frac{2}{3} x^{\frac{3}{2}} + C$

$\frac{n-1}{n} \rightarrow \frac{1}{2}$
 $\frac{1}{2} + 1 = \frac{3}{2}$

③ $\int x^5 dx = \frac{x^6}{6} + C$

⑤ $\int \sec^2 x dx = \tan x + C$

* $\frac{d}{dx} x^n = n x^{n-1}$
 $\frac{1}{n} \frac{d}{dx} x^n = x^{n-1}$ $n=4$ *

⑥ $\int \sec x \tan x dx = \sec x + C$

⑦ $\int \frac{e}{x} dx = e \int \frac{1}{x} dx = e (\ln|x| + C)$
 $= e \ln|x| + C$, where $C = eC'$

Find the following indefinite integrals

a) $\int \frac{(1+\sqrt{x})^2}{x^2} dx = \int \frac{1+2\sqrt{x}+x}{x^2} dx = \int \left(\frac{1}{x^2} + 2x^{-1/2} + \frac{1}{x} \right) dx$

$= \int \frac{1}{x^2} dx + 2 \int x^{-1/2} dx + \int \frac{1}{x} dx$

$= -\frac{1}{x} + 2(-2)^{-1/2} + \ln|x| + C$

$= -\frac{1}{x} - \frac{4}{\sqrt{x}} + \ln|x| + C$

