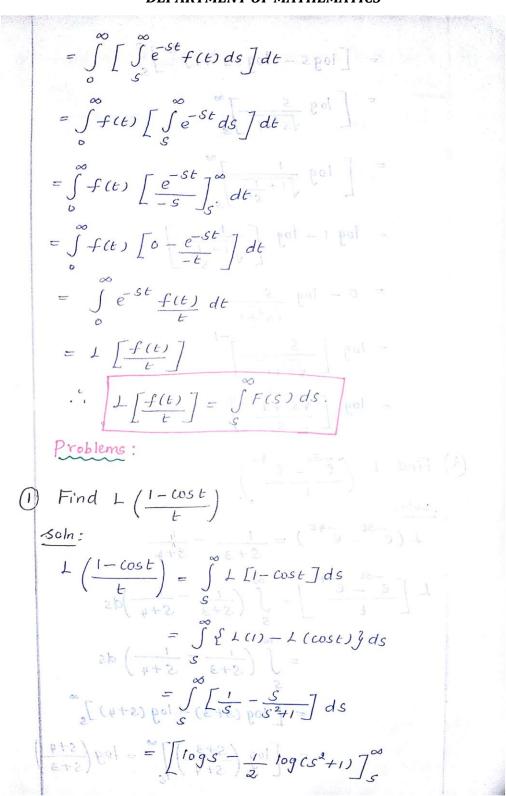




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$$= \left[\log s - \log (s^{2}+1)^{1/2}\right]_{s}^{\infty}$$

$$= \left[\log \frac{s}{\sqrt{s^{2}+1}}\right]_{s}^{\infty}$$

$$= \left[\log 1 - \log \left[\frac{1}{\sqrt{1+\frac{1}{s^{2}}}}\right]_{s}^{\infty}$$

$$= \log 1 - \log \left[\frac{1}{\sqrt{1+\frac{1}{s^{2}}}}\right]$$

$$= 0 - \log \frac{s}{\sqrt{s^{2}+1}}$$

$$= \log \left[\frac{s}{\sqrt{s^{2}+1}}\right]$$

$$= \log \left[\frac{\sqrt{s^{2}+1}}{\sqrt{s^{2}+1}}\right]$$

$$= \log \left(\frac{\sqrt{s^{2}+1}}{\sqrt{s^{2}+1}}\right)$$

$$= \log \left(\frac{\sqrt{s^{2}+1}}{\sqrt{s^{2}+1}}\right)$$

$$= \left[\log (s+3) - \log (s+4)\right]_{s}^{\infty}$$

$$= \left[\log \left(\frac{s+3}{s+4}\right)\right]_{s}^{\infty} = \log \left(\frac{s+4}{s+3}\right)$$





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Find
$$L \left[\frac{1-\cos at}{t}\right] = \int_{S}^{\infty} L \left(1-\cos at\right) ds$$

$$= \int_{S}^{\infty} \left[\frac{1}{s} - \frac{s}{s^2 + a^2}\right] ds$$

$$= \left[\log s - \frac{1}{2}\log(s^2 + a^2)\right]_{S}^{\infty}$$

$$= \left[\log \left(\frac{s}{\sqrt{s^2 + a^2}}\right)\right]_{S}^{\infty}$$

$$= \log\left(\frac{s}{\sqrt{s^2 + a^2}}\right)$$

$$= \frac{1}{2}\left[\log(s^2 + a^2) - \log(s^2 + b^2)\right]_{S}^{\infty}$$

$$= \frac{1}{2}\left[\log\left(s^2 + a^2\right) - \log\left(s^2 + b^2\right)\right]_{S}^{\infty}$$

$$= \frac{1}{2}\left[\log\left(s^2 + a^2\right) - \log\left(s^2 + a^2\right)\right]_{S}^{\infty}$$





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Find the Laplace transform of
$$e^{t}$$
 $\int_{s}^{t} t \cos t \, dt$

Soln:

$$L\left[e^{t}\int_{s}^{t} t \cos t \, dt\right] = \left[1 + \left(\int_{s}^{t} t \cos t \, dt\right)\right]_{s \to s+1}$$

$$= \left[\frac{1}{s} \left(-\frac{1}{s} t \left(t \cos t\right)\right)\right]_{s \to s+1}$$

$$= \left[\frac{1}{s} \left(\frac{-d}{ds} t \left(t \cos t\right)\right)\right]_{s \to s+1}$$

$$= \left[\frac{1}{s} \left(\frac{s}{s^{2}+1}\right)\right]_{s \to s+1}$$

$$= \left[\frac{1}{s} \left(\frac{s^{2}+1-as^{2}}{(s^{2}+1)^{2}}\right)\right]_{s \to s+1}$$

$$= \left[\frac{1}{s} \left(\frac{1-s^{2}}{(s^{2}+1)^{2}}\right)\right]_{s \to s+1}$$

$$= \left[\frac{s^{2}-1}{s \left(s^{2}+1\right)^{2}}\right]_{s \to s+1}$$

$$= \frac{(s+1)^{3}-1}{(s+1)\left((s+1)^{3}+1\right)^{2}}$$

$$= \frac{s^{2}+as}{(s+1)\left(s^{3}+as+a\right)^{2}}$$
(b) Evaluate using Laplace transform
$$\int_{s}^{s} t e^{-at} \sin 3t \, dt$$





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(5) Find the Laplace transform of
$$e^{\pm}\int_{0}^{t} t \cos t \, dt$$

$$\frac{|Soln|}{|Soln|} = \int_{0}^{t} \int_{0}^{t} t \cos t \, dt = \int_{0}^{t} \int_{0}^{t} \int_{0}^{t} t \cos t \, dt = \int_{0}^{t} \int_{0$$