Use the formula sheet! Section 7.1

(1) $\mathcal{L}\{t^2+6t-3\}$

$= \frac{2!}{s^3} + 6\left(\frac{1!}{s^2}\right) - 3\left(\frac{1}{s}\right)$

$= \frac{2}{s^3} + \frac{6}{s^2} - \frac{3}{s}$

(2) $\mathcal{L}\{(t+1)^3\}$

Recall $(a+b)^3 = a^3+3a^2b+3ab^2+b^3$

$= \mathcal{L}\{t^3+3t^2+3t+1\}$

$= \frac{3!}{s^4} + 3\left(\frac{2!}{s^3}\right) + 3\left(\frac{1!}{s^2}\right) + \frac{1}{s}$

$= \frac{6}{s^4} + \frac{6}{s^3} + \frac{3}{s^2} + \frac{1}{s}$

(3) $\mathcal{L}\{1+e^{4t}\}$

$= \frac{1}{s} + \frac{1}{s-4}$

→

(4) $\mathcal{L}\{\sin 2t \cos 2t\}$

Recall $\sin 2\theta = 2\sin\theta\cos\theta$

$\frac{1}{2}\sin 2\theta = \sin\theta\cos\theta$

$\frac{1}{2}\sin 4t = \sin 2t \cos 2t$

$= \mathcal{L}\{\frac{1}{2}\sin 4t\}$

$= \frac{1}{2}\left(\frac{4}{s^2+16}\right)$

$= \frac{2}{s^2+16}$

(5) $\mathcal{L}\{\sin(4t+5)\}$

Recall $\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$

$= \mathcal{L}\{\sin 4t \cos 5 + \cos 4t \sin 5\}$

Note: $\cos 5$ and $\sin 5$ are constants

$= \mathcal{L}\{\cos 5 \sin 4t + \sin 5 \cos 4t\}$

$= (\cos 5)\left(\frac{4}{s^2+16}\right) + (\sin 5)\left(\frac{s}{s^2+16}\right)$

$= \frac{4\cos 5 + (\sin 5)s}{s^2+16}$