iii) $t^3 + 2t^2 - t + 4 = f(t)$

$F(s) = L[t^3] + L[2t^2] - L[t] + L[4]$

$= \frac{3!}{s^4} + 2\left[\frac{2!}{s^3}\right] - \frac{1}{s} + 4/s$

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

iv) $e^{-2t}\cos 5t = f(t)$

$f(s) = L[e^{-2t}\cos 5t]$

$= \frac{s+5}{(s+5)^2 + 5^2}$

$= \frac{s+5}{s^2 + 10s + 50}$

v) $t\sin 3t = f(t)$

$f(s) = L[t\sin 3t]$

$= \frac{-d}{ds}\left[\frac{3}{s^2+9}\right]$

Using quotient rule

$f(s) = -1\left[\frac{(s^2+9)0 - 3(2s)}{(s^2+9)^2}\right]$

$= \frac{6s}{(s^2+9)^2}$

vi) $\frac{e^{-t} - e^{-2t}}{t} = f(t)$

$f(s) = L\left[\frac{1}{t}[e^{-t} - e^{-2t}]\right]$

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

$= \int\frac{1}{s^2+3s+2}\,ds$

$F(s) = \ln(s^2+3s+2)$

vii) $e^{4t}\cos 2t = f(t)$

$f(s) = L[e^{4t}\cos 2t]$

$= \frac{s-4}{(s-4)^2+4^2} = \frac{s-4}{s^2 - 8s + 32}$

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