

Math.240, QUIZ 10

Surname & Name:

Question: Find Laplace transform of

$$\text{a) } f(t) = \begin{cases} 1-t, & 0 < t < 1 \\ 0, & t > 1 \end{cases}$$

$$\mathcal{L}\{f(t)\} = \int_0^{\infty} e^{-st} f(t) dt = \int_0^1 (1-t)e^{-st} dt = \frac{1}{s} - \frac{1}{s^2} + \frac{e^{-s}}{s^2}$$

OR

$$f(t) = 1-t + \begin{cases} 0, & 0 < t < 1 \\ t-1, & t > 1 \end{cases}, \text{ and}$$

$$F(s) = \frac{1}{s} - \frac{1}{s^2} + \frac{e^{-s}}{s^2}.$$

$$\text{b) } g(t) = t^2 e^{4t} - 5 + e^t \cos \sqrt{7}t.$$

$$\begin{aligned} G(s) &= -\frac{d^2}{ds^2} \left(\frac{1}{s-4} \right) - \frac{5}{s} + \frac{s-1}{(s-1)^2 + 7} \\ &= \frac{-2}{(s-4)^3} - \frac{5}{s} + \frac{s-1}{(s-1)^2 + 7}. \end{aligned}$$