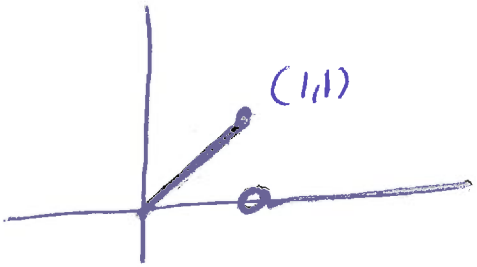
Quiz 6, November 10, 2016

Find the Laplace transform of



Answer: We compute

$$\mathcal{L}(f) = \int_0^\infty e^{-st} f(t)dt = \int_0^1 te^{-st}dt.$$

Use integration by parts with $u = t$ and $dv = e^{-st}dt$. Compute

$$du = dt \quad v = \frac{e^{-st}}{-s}.$$

Obtain

$$\mathcal{L}(f) = \left(t\frac{e^{-st}}{-s} - \int \frac{e^{-st}}{-s}dt\right)\Big|_0^1 = \left(t\frac{e^{-st}}{-s} - \frac{e^{-st}}{s^2}\right)\Big|_0^1 = \boxed{\frac{e^{-s}}{-s} - \frac{e^{-s}}{s^2} + \frac{1}{s^2}.}$$