

Quiz 8, April 13, 2017, 1:15 class

Find the inverse Laplace transform of $F(s) = \frac{3s+5}{s^2-6s+25}$.

Answer: We compute

$$\begin{aligned}\mathcal{L}^{-1}\left(\frac{3s+5}{s^2-6s+25}\right) &= \mathcal{L}^{-1}\left(\frac{3s+5}{s^2-6s+9+16}\right) = \mathcal{L}^{-1}\left(\frac{3s+5}{(s-3)^2+4^2}\right) = \mathcal{L}^{-1}\left(\frac{3(s-3)+5+9}{(s-3)^2+4^2}\right) \\ &= 3\mathcal{L}^{-1}\left(\frac{(s-3)}{(s-3)^2+4^2}\right) + \frac{14}{4}\mathcal{L}^{-1}\left(\frac{4}{(s-3)^2+4^2}\right) = \boxed{3e^{3t}\cos 4t + \frac{7}{2}e^{3t}\sin 4t.}\end{aligned}$$