

Problem 29 in Section 7.1. Find the inverse Laplace transform of

$$F(s) = \frac{5-3s}{s^2+9}.$$

Solution.

$$\mathcal{L}^{-1}\left(\frac{5-3s}{s^2+9}\right) = \frac{5}{3}\mathcal{L}^{-1}\left(\frac{3}{s^2+9}\right) - 3\mathcal{L}^{-1}\left(\frac{s}{s^2+9}\right) = \boxed{\frac{5}{3}\sin 3t - 3\cos 3t.}$$

Of course, we used $\mathcal{L}(\cos kt) = \frac{s}{s^2+k^2}$ and $\mathcal{L}(\sin kt) = \frac{k}{s^2+k^2}$ from the fact sheet.