



1. Find the Laplace transforms of the following waveforms:

a) $t \sin(t - \tau)u(t - \tau)$ where $\tau > 0$

b) $t \frac{d}{dt} [te^{-at}]$

c) $f(t) = (t - b)e^{-at}$

d) $t \int_0^t e^{-at} dt$

2. Show that the following identity is valid:

$$\mathcal{L}\{tf(t)\} = -\frac{d}{ds}F(s)$$

3. Find the inverse Laplace transform for each of the following expressions:

a) $F(s) = \frac{12s + 20}{s^2 + 5s}$

b) $F(s) = \frac{12s + 66}{s^2 + 16s + 289}$

c) $F(s) = -\frac{-s^3 - 36s^2 - 863s - 6900}{(s^2 + 24s + 400)(s^2 + 24s + 225)}$

d) $F(s) = \frac{s^3 + 30s^2 + 229s + 340}{s(s^2 + 18s + 85)}$

4. Find the Laplace transform of $t^n e^{-at}$.

5. Find the inverse Laplace transform of $\frac{e^{-2s}}{(s + 4)^n}$.