

TWK2A

The Laplace transform (Section 7.1)

Problems

Use the definition of the Laplace transform to find $\mathcal{L}\{f(t)\}$ in the following:

1. $f(t) = \begin{cases} t, & 0 \leq t < 1 \\ 1, & t \geq 1 \end{cases}$

2. $f(t) = \begin{cases} 2t + 1, & 0 \leq t < 1 \\ 0, & t \geq 1 \end{cases}$

3. $f(t) = e^{-2t-5}$

4. $f(t) = \begin{cases} 0, & 0 \leq t < a \\ c, & a \leq t < b \\ 0, & t \geq b \end{cases}$

5. $f(t) = t^2 e^{-2t}$

6. $f(t) = \begin{cases} 4, & 0 \leq t < 2 \\ 0, & t \geq 2 \end{cases}$

7. $f(t) = \begin{cases} \sin t, & 0 \leq t < \pi \\ 0, & t \geq \pi \end{cases}$

8. $f(t) = e^t \cos t$

9. $f(t) = t \cos t$

10. $f(t) = \cosh kt$

11. $f(t) = \begin{cases} 0, & 0 \leq t < \frac{\pi}{2} \\ \cos t, & t \geq \frac{\pi}{2} \end{cases}$

Use tables to find the Laplace transform of the following:

12. $f(t) = t^2 + 6t - 3$

13. $f(t) = (2t - 1)^3$

14. $f(t) = \cos 5t + \sin 2t$