Answer

15.6
Find $G(s)$ given that $g(t) = 2r(t) - 2r(t - 2)$.

15.7
Find the Laplace transform of the following signals:

- (a)
  \[ f(t) = (2t + 4)u(t) \]

  Answer

- (b)
  \[ g(t) = (4 + 3e^{-2t})u(t) \]

  Answer

- (c)
  \[ h(t) = (6 \sin(3t) + 8 \cos(3t))u(t) \]

  Answer

- (d)
  \[ x(t) = (e^{-2t} \cosh(4t))u(t) \]

  Answer

15.8
Find the Laplace transform $F(s)$, given that $f(t)$ is:

- (a)
\[ g(t) = \frac{d}{dt}(te^{-t}\cos t) \]

- 15.11

Find \( F(s) \) if:

- (a)

\[ f(t) = 6e^{-t}\cosh 2t \]

- Answer

- (b)

\[ f(t) = 3te^{-2t}\sinh 4t \]

- Answer

- (c)

\[ f(t) = 8e^{-3t}\cosh tu(t - 2) \]

- Answer

- 15.12

If \( g(t) = 4e^{-2t}\cos 4t \), find \( G(s) \).

- 15.13

Find the Laplace transform of the following functions:

- (a)

\[ t \cos tu(t) \]

- Answer

- (b)

\[ e^{-t}\sin tu(t) \]
Answer

- (c) \[ \frac{\sin \beta t}{t} u(t) \]

Answer

- 15.14

Find the Laplace transform of the signal in Fig. 15.26.

![Figure 15.26](image)

For Prob. 15.14.

- 15.15

Determine the Laplace transform of the function in Fig. 15.27.

![Figure 15.27](image)

For Prob. 15.15.

Answer

- 15.16

Obtain the Laplace transform of \( f(t) \) in Fig. 15.28.

![Figure 15.28](image)

For Prob. 15.16.

- 15.17
Using Fig. 15.29, design a problem to help other students better understand the Laplace transform of a simple, non-periodic waveshape.

![Figure 15.29](image)

For Prob. 15.17.

- Answer

  - 15.18

  Obtain the Laplace transforms of the functions in Fig. 15.30.

![Figure 15.30](image)

For Prob. 15.18.

- 15.19

  Calculate the Laplace transform of the infinite train of unit impulses in Fig. 15.31.

![Figure 15.31](image)

For Prob. 15.19.

- Answer

  - 15.20

Using Fig. 15.32, design a problem to help other students better understand the Laplace transform of a simple, periodic waveshape.
• 15.24

**Design a problem to help other students better understand how to find the initial and final value of a transfer function.**

• 15.25

Let

\[ F(s) = \frac{18(s + 1)}{(s + 2)(s + 3)} \]

- (a)

Use the initial and final value theorems to find \( f(0) \) and \( f(\infty) \).

- (b)

Answer

Verify your answer in part (a) by finding \( f(t) \), using partial fractions.

- (b)

Answer

• 15.26

Determine the initial and final values of \( f(t) \), if they exist, given that:

- (a)

\[ F(s) = \frac{5s^2 + 3}{s^3 + 4s^2 + 6} \]

- (b)

Section 15.4 The Inverse Laplace Transform

• 15.27

Determine the inverse Laplace transform of each of the following functions:

- (a)

\[ F(s) = \frac{1}{s} + \frac{2}{s + 1} \]