

Nombre: Arellano Granados Angel Mariano Fecha: 24/05/2022

Tarea: 5

Teoremas de traslación y función escalón unitario

1) $f(t) = te^t$

$$a = 1$$

$$L\{t\}$$

$$\left. \frac{1}{s^2} \right|_{s \rightarrow s-1}$$

$$\frac{1}{(s-1)^2}$$

2) $f(t) = e^t \cos t$

$$a = 1$$

$$L\{\cos t\} \quad k = 1$$

$$\left. \frac{s}{s^2 + 1} \right|_{s \rightarrow s-1}$$

$$\frac{s-1}{(s-1)^2 + 1}$$

3) $f(t) = e^{-2t} \sin 4t$

$$a = -2$$

$$L\{\sin 4t\} \quad k = 4$$

$$\left. \frac{4}{s^2 + 16} \right|_{s \rightarrow s+2}$$

$$\frac{4}{(s+2)^2 + 16}$$

4) $f(t) = e^t \sinh 3t$

$$a = 1$$

$$L\{\sinh 3t\} \quad k = 3$$

$$\left. \frac{1}{s^2 - 9} \right|_{s \rightarrow s-1}$$

$$\frac{1}{(s-1)^2 - 9}$$

5) $L\{-3u(t-2)\}$

$$L\{-3\}e^{-2s}$$

$$\frac{-3e^{-2s}}{s}$$

6) $L\{u(t-3)\}$

$$L\{1\}e^{-3s}$$

$$\frac{e^{-3s}}{s}$$

7) $L\{(2t-3)u(t-1)\}$

$$e^{-s}L\{2t-3\}$$

$$e^{-s}\left(\frac{2}{s^2}-\frac{1}{s}\right)$$

8) $L\{\cos 2t u(t-\pi)\}$

$$g(t) = \cos 2t$$

$$a = -\pi$$

$$e^{-\pi s}L\{\cos 2t\}$$

$$\frac{s e^{-\pi s}}{s^2 + 4}$$

9) $f(t) = \begin{cases} -2 & 0 \leq t < 3 \\ 5 & 3 \leq t < 5 \\ -1 & 5 \leq t < 8 \\ 0 & t \geq 8 \end{cases}$

$$f(t) = -2 + [5+2]u(t-3) + [-1-5]u(t-5) + [0+1]u(t-8)$$

$$f(t) = -2 + 7u(t-3) - 6u(t-5) + u(t-8)$$

$$L\{-2\} + 4L\{u(t-3)\} - 6L\{u(t-5)\} + L\{u(t-8)\}$$

$$\frac{-2}{s} + \frac{4e^{-3s}}{s} - \frac{6e^{-5s}}{s} + \frac{e^{-8s}}{s}$$

10) $f(t) = \begin{cases} 4t & 0 \leq t < 4 \\ 1 & 4 \leq t < 5 \\ -2 & 5 \leq t < 7 \\ 3 & t \geq 7 \end{cases}$

$$f(t) = 4t + [1-4t]u(t-4) + [-2-1]u(t-5) + [3+2]u(t-7)$$

$$f(t) = 4t + u(t-4) - 4t u(t-4) - 3u(t-5) + 5u(t-7)$$

$$4L\{t\} + L\{u(t-4)\} + L\{-4t u(t-4)\} + e^{-4s}L\{-4t-16\} - 3L\{u(t-5)\} + 5L\{u(t-7)\}$$

$$\frac{4}{s^2} + \frac{e^{-4s}}{s} + e^{-4s} \left(\frac{-4}{s^2} - \frac{16}{s} \right) - \frac{3e^{-5s}}{s} + \frac{5e^{-7s}}{s}$$