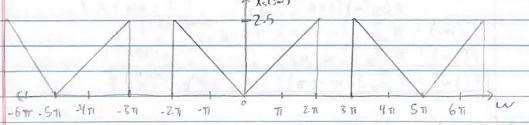


There will be scaling by Fs = Ts

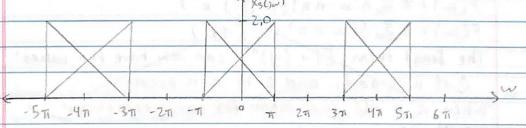
Using Fs = 2.5 Hz is better in this situation as it

prevents accidental aliasing, which can ruin the signal

When Fs = 2.5 Hz, We get this graph with no aliasing:



When Fs = 2.0 Hz, we get this graph that has alrasing:



Clearly, the Fs = 2.5 Hz (w = 5 Troad/s) graph has better results. A bandpass filter from 3 Th < | w | < 5 Th would help to recover the signal. The minimum value for Fs would be 5 Th rad/s. This is because any lower values would create all asing with respect to the frequency domain, which should be avoided if possible.

[Sorry these graphs are a bitugly]

2. a) Looking at the graph, we observe that:

Odd samples (close to -3, -1,1,3) - 8 train separated

by 2, with a delay of 1 + v

Even samples (-2,0,2) - 8 train with no delay

Adding the odd and even samples yields:

[f(t) = \$\frac{2}{5}\displant \delta(t - (1 + \tau + 2k)) + \frac{2}{5}\delta(t - 2k)

f(t) = \frac{2}{5}(t - (1+\tau)) + \frac{2}{5}(t)

b) Find the Fourier Transform $F(jw) = \pi \delta_{\pi}(w) e^{-3w(1+\tau)} + \pi \delta_{w}(w)$ $= \pi \delta_{\pi}(w) (1+e^{-3w(1+\tau)}) \qquad [w_{0} = \pi]$ $F(jw) = \pi \sum_{n=0}^{\infty} \delta(w-n\pi) \cdot (1+e^{-3w\pi(1+\tau)})$ $F(jw) = \pi \sum_{n=0}^{\infty} \delta(w-n\pi) \cdot (1+e^{-3\pi n}e^{-3\pi n\tau})$ $F(jw) = \pi \sum_{n=0}^{\infty} \delta(w-n\pi) \cdot (1+e^{-3\pi n}e^{-3\pi n\tau})$

F(jw) when T=0 Plug into answer from part b F(jw) = T = 8(w-n T) (1+(-1)"e") F()w) = T & S(W-NT) (1+(-1)") The final term [1+(-1)"] can only have two values: Oif n is odd, and 2 if n is even When n is odd, that means the entire expression Will get zeroed out When n is even, that means the entire expression will be scaled by a factor of 2 F()w) = TI & 8(W-2NT) . 2 F(iw) = 271 827(w) This result is actually the fourier transform for S. (+) This was the result I expected before performing any calculations because when I goes to O, the non-uniform cases will just go to the uniform case,

The sampled signal is represented by $f(t)g(t)$. We must first the Fourter Transform of this. $C_{15}(J)\omega = \frac{1}{2\pi}F(J)\omega * (7J)\omega) \qquad [consolution\ prept]$ $C_{15}(J)\omega = \frac{1}{2\pi}\left[\pi_{\frac{1}{12}} \delta(\omega - n\pi)\cdot (1+(-1)^n e^{-J\pi n\pi})\right] * \Lambda(\frac{\omega}{\pi})$ $C_{15}(J)\omega = 0.5 \underset{n=0}{\overset{\sim}{\sim}} \Lambda(\frac{\omega - n\pi}{\pi})\cdot (1+(-1)^n e^{-J\pi n\pi})]$ Find the baseband replica $[n=0]$ $C_{15,0}(J)\omega = 0.5 \Lambda(\frac{\omega}{\pi})$ When $[n=1]$ $C_{15,1}(J)\omega = 0.5 \Lambda(\frac{\omega - n}{\pi})\cdot (1+(-1)^1 e^{-J\pi n\pi})$ $C_{15,1}(J)\omega = \Lambda(\frac{\omega - n}{\pi})\cdot (1-e^{-Jn\pi})$ $C_{15,1}(J)\omega = \Lambda(\frac{\omega - n}{\pi})\cdot (1-e^{-Jn\pi})$ $C_{15,1}(J)\omega = \Lambda(\frac{\omega - n}{\pi})\cdot (1-e^{-Jn\pi})$ $C_{15,1}(J)\omega = \frac{1}{2}J\pi\pi\Lambda(\frac{\omega - n}{\pi})$ When $[n=-1]$ Same steps as $[n=1]$, but $f(n)$ signs $C_{15,1}(J)\omega = -\frac{1}{2}J\pi\pi\Lambda(\frac{\omega - n}{\pi})$
We must first the Fourier Transform of this, $C_{15}(JW) = \frac{1}{2\pi} F(JW) * (7(JW)) \qquad [convolution prop. 7]$ $C_{15}(JW) = \frac{1}{2\pi} \left[\pi_{\frac{N}{10}} \otimes ((W-N\pi)) \cdot (1+(-1)^N e^{-J\pi n\tau}) \right] * \Lambda(\frac{W}{\pi})$ $C_{15}(JW) = 0.5 \underset{N=0}{\times} \Lambda(\frac{W-N\pi}{\pi}) \cdot (1+(-1)^N e^{-J\pi n\tau}) $ Find the baseband replica $[n=0]$ $C_{15,0}(JW) = 0.5 \Omega(\frac{W}{\pi})(2)$ $C_{15,0}(JW) = 0.5 \Omega(\frac{W}{\pi})(2)$ $C_{15,1}(JW) = 0.5 \Omega(\frac{W-\pi}{\pi}) \cdot (1+(-1)^1 e^{-J\pi\tau})$ $C_{15,1}(JW) = \Lambda(\frac{W-\pi}{\pi}) \cdot (1-(1-j\pi\tau))$ $C_{15,1}(JW) = \Lambda(\frac{W-\pi}{\pi}) \cdot (1-(1-j\pi\tau))$ $C_{15,1}(JW) = \frac{1}{2} J\pi\tau \Lambda(\frac{W-\pi}{\pi})$ $When [n=1] Same steps as [n=1], but flip signs C_{15,1}(JW) = -\frac{1}{2} J\pi\tau \Lambda(\frac{W-\pi}{\pi})$
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We must first the Fourier Transform of this, $C_{15}(JW) = \frac{1}{2\pi} F(JW) * (7(JW)) \qquad [convolution prop. 7]$ $C_{15}(JW) = \frac{1}{2\pi} \left[\pi_{\frac{N}{10}} \otimes ((W-N\pi)) \cdot (1+(-1)^N e^{-J\pi n\tau}) \right] * \Lambda(\frac{W}{\pi})$ $C_{15}(JW) = 0.5 \underset{N=0}{\times} \Lambda(\frac{W-N\pi}{\pi}) \cdot (1+(-1)^N e^{-J\pi n\tau}) $ Find the baseband replica $[n=0]$ $C_{15,0}(JW) = 0.5 \Omega(\frac{W}{\pi})(2)$ $C_{15,0}(JW) = 0.5 \Omega(\frac{W}{\pi})(2)$ $C_{15,1}(JW) = 0.5 \Omega(\frac{W-\pi}{\pi}) \cdot (1+(-1)^1 e^{-J\pi\tau})$ $C_{15,1}(JW) = \Lambda(\frac{W-\pi}{\pi}) \cdot (1-(1-j\pi\tau))$ $C_{15,1}(JW) = \Lambda(\frac{W-\pi}{\pi}) \cdot (1-(1-j\pi\tau))$ $C_{15,1}(JW) = \frac{1}{2} J\pi\tau \Lambda(\frac{W-\pi}{\pi})$ $When [n=1] Same steps as [n=1], but flip signs C_{15,1}(JW) = -\frac{1}{2} J\pi\tau \Lambda(\frac{W-\pi}{\pi})$
We must fred the Fourier Transform of this, $C_{15}(jw) = \frac{1}{2\pi} F(jw) * (7(jw)) \qquad [convolution prop?]$ $C_{15}(jw) = \frac{1}{2\pi} \left[\pi_{n=\infty}^{\infty} \delta(w-n\pi) \cdot (1+(-1)^n e^{-j\pi n\pi}) \right] * \Delta(\frac{w}{\pi})$ $C_{15}(jw) = 0.5 \sum_{n=\infty}^{\infty} \Delta(\frac{w-n\pi}{n}) \cdot (1+(-1)^n e^{-j\pi n\pi}) $ $Find the baseband replica [n=0] C_{15,0}(jw) = 0.5 \Delta(\frac{w}{\pi}) (2) C_{15,0}(jw) = \Delta(\frac{w}{\pi}) When [n=1] C_{15,1}(jw) = 0.5 \Delta(\frac{w-\pi}{n}) \cdot (1+(-1)^n e^{-j\pi\pi}) C_{15,1}(jw) = \Delta(\frac{w-\pi}{n}) \cdot (1-(1-j\pi\pi)) C_{15,1}(jw) = \Delta(\frac{w-\pi}{n}) \cdot (1-(1-j\pi\pi)) C_{15,1}(jw) = \frac{1}{2} j\pi\pi \Delta(\frac{w-\pi}{n}) When [n=-1] Same steps as [n=1], but f(ip) signs C_{15,-1}(jw) = -\frac{1}{2} j\pi\pi \Delta(\frac{w-\pi}{n})$
$C_{15}(jw) = \frac{1}{2\pi} F(jw) * (7(jw)) $ [convolution prop.?] $C_{15}(jw) = \frac{1}{2\pi} \left[\pi_{p \to \infty} \delta(w - n\pi) \cdot (1 + (-1)^n e^{-j\pi n\pi}) \right] * \Delta(\frac{w}{\pi})$ $C_{15}(jw) = 0.5 \underset{\infty}{\times} \Delta(\frac{w - n\pi}{\pi}) \cdot (1 + (-1)^n e^{-j\pi n\pi}) \right] * \Delta(\frac{w}{\pi})$ Find the baseband septica $[n = 0]$ $C_{15,0}(jw) = 0.5 \Delta(\frac{w}{\pi}) (2)$ $C_{15,0}(jw) = \Delta(\frac{w}{\pi}) \cdot (1 + (-1)^n e^{-j\pi n\pi})$ $When [n = 1] C_{15,1}(jw) = 0.5 \Delta(\frac{w - \pi}{\pi}) \cdot (1 + (-1)^n e^{-j\pi n\pi}) C_{15,1}(jw) = \Delta(\frac{w - \pi}{\pi}) \cdot (1 - (1 - j n\pi)) C_{15,1}(jw) = \Delta(\frac{w - \pi}{\pi}) \cdot (1 - (1 - j n\pi)) C_{15,1}(jw) = \frac{1}{2} j\pi\pi\Delta(\frac{w - \pi}{\pi}) When [n = -1] Same steps as n = 1, but f(p) signs C_{15,-1}(jw) = -\frac{1}{2} j\pi\pi\Delta(\frac{w - \pi}{\pi})$
$C_{15}(jw) = \frac{1}{2\pi} \left(\pi_{n \to \infty} \delta(w - n\pi), \left(\frac{1}{1}(-1)^n e^{-j\pi n\pi} \right) \right) \pm \Delta \left(\frac{w}{\pi} \right)$ $C_{15}(jw) = 0.5 \stackrel{\sim}{\sim} \Delta \left(\frac{w - n\pi}{\pi} \right), \left(\frac{1}{1} + (-1)^n e^{-j\pi n\pi} \right) \right)$ Find the baseband replica $\left[n = 0 \right]$ $C_{15,0}(jw) = 0.5 \Delta \left(\frac{w}{\pi} \right) \left(2 \right)$ $C_{15,0}(jw) = \Delta \left(\frac{w}{\pi} \right), \left(\frac{1}{1} + (-1)^n e^{-j\pi n\pi} \right)$ $C_{15,1}(jw) = 0.5 \Delta \left(\frac{w - \pi}{\pi} \right), \left(\frac{1}{1} + (-1)^n e^{-j\pi n\pi} \right)$ $C_{15,1}(jw) = \Delta \left(\frac{w - \pi}{\pi} \right), \left(\frac{1}{1} - (-1)^n e^{-j\pi n\pi} \right)$ $C_{15,1}(jw) = \Delta \left(\frac{w - \pi}{\pi} \right), \left(\frac{1}{1} - (-1)^n e^{-j\pi n\pi} \right)$ $When \lim_{n \to \infty} \Delta \left(\frac{w - \pi}{\pi} \right) When \lim_{n \to \infty} \Delta \left(\frac{w - \pi}{\pi} \right) V_{15,1}(jw) = \frac{1}{2} j\pi \pi \Delta \left(\frac{w - \pi}{\pi} \right) V_{15,1}(jw) = \frac{1}{2} j\pi \pi \Delta \left(\frac{w - \pi}{\pi} \right)$
$ \begin{array}{lll} \left(T_{S}(j\omega)=0.5 \stackrel{>}{\sim} \Delta\left(\frac{\omega-n\pi}{\pi}\right) \cdot (1+(-1)^{n}e^{-j\pi n\tau})\right) \\ &= Find the baseband replica [n=0] \\ \left(T_{S,0}(j\omega)=0.5 \Omega\left(\frac{\omega}{\pi}\right)(2) \\ \left(T_{S,0}(j\omega)=\Delta\left(\frac{\omega}{\pi}\right)\right) \\ &= \frac{\omega-n}{\pi} \cdot (1+(-1)^{l}e^{-j\pi\tau}) \\ \left(T_{S,1}(j\omega)=0.5 \Delta\left(\frac{\omega-n}{\pi}\right) \cdot (1-(1-j\pi\tau)) \\ \left(T_{S,1}(j\omega)=\Delta\left(\frac{\omega-n}{\pi}\right) \cdot (1-(1-j\pi\tau)) \\ \left(T_{S,1}(j\omega)=\frac{1}{2}j\pi\tau\Delta\left(\frac{\omega-n}{\pi}\right) \\ &= \frac{\omega-n}{\pi} \cdot (1-(1-j\pi\tau)) \\ &= \omega-n$
Find the baseband replica $[n=0]$ $G_{5,0}(j\omega) = 0.5 \ \Delta(\frac{\omega}{\pi})(2)$ $G_{5,0}(j\omega) = \Delta(\frac{\omega}{\pi})(2)$ When $[n=1]$ $G_{5,1}(j\omega) = 0.5 \ \Delta(\frac{\omega-\pi}{\pi}) \cdot (1+(-1)^{i}e^{-J\pi\tau})$ $G_{5,1}(j\omega) = \Delta(\frac{\omega-\pi}{\pi}) \cdot (1-e^{-j\pi\tau})$ $G_{5,1}(j\omega) = \Delta(\frac{\omega-\pi}{\pi}) \cdot (1-(1-j\pi\tau))$ $G_{5,1}(j\omega) = \frac{1}{2} j\pi\tau \Delta(\frac{\omega-\pi}{\pi})$ When $[n=-1]$ Same steps as $n=1$, but flip signs $G_{5,1}(j\omega) = -\frac{1}{2} j\pi\tau \Delta(\frac{\omega+\pi}{\pi})$
$G_{5,0}(j\omega) = 0.5 \Omega(\frac{\omega}{\pi})(2)$ $G_{5,0}(j\omega) = \Delta(\frac{\omega}{\pi})$ $When [n = 1]$ $G_{5,1}(j\omega) = 0.5 \Delta(\frac{\omega-\pi}{\pi}) \cdot (1+(-1)^{l}e^{-J\pi\tau})$ $G_{5,1}(j\omega) = \Delta(\frac{\omega-\pi}{\pi}) \cdot (1-e^{-j\pi\tau})$ $G_{5,1}(j\omega) = \Delta(\frac{\omega-\pi}{\pi}) \cdot (1-(1-j\pi\tau))$ $G_{5,1}(j\omega) = \frac{1}{2}j\pi\tau\Delta(\frac{\omega-\pi}{\pi})$ $When [n = -1]$ $Same steps as n = 1, but flip signs$ $G_{5,1-1}(j\omega) = -\frac{1}{2}j\pi\tau\Delta(\frac{\omega+\pi}{\pi})$
$G_{5,0}(j\omega) = 0.5 \Omega(\frac{\omega}{\pi})(2)$ $G_{5,0}(j\omega) = \Delta(\frac{\omega}{\pi})$ $When [n = 1]$ $G_{5,1}(j\omega) = 0.5 \Delta(\frac{\omega-\pi}{\pi}) \cdot (1+(-1)^{l}e^{-J\pi\tau})$ $G_{5,1}(j\omega) = \Delta(\frac{\omega-\pi}{\pi}) \cdot (1-e^{-j\pi\tau})$ $G_{5,1}(j\omega) = \Delta(\frac{\omega-\pi}{\pi}) \cdot (1-(1-j\pi\tau))$ $G_{5,1}(j\omega) = \frac{1}{2}j\pi\tau\Delta(\frac{\omega-\pi}{\pi})$ $When [n = -1]$ $Same steps as n = 1, but flip signs$ $G_{5,1-1}(j\omega) = -\frac{1}{2}j\pi\tau\Delta(\frac{\omega+\pi}{\pi})$
$(75,0) = \Delta(\frac{w}{n})$ When $[n=1]$ $(75,1)(w) = 0.5 \Delta(\frac{w-n}{n}) \cdot (1+(-1)^{1}e^{-\sqrt{n}v})$ $(75,1)(w) = \Delta(\frac{w-n}{n}) \cdot (1-e^{-\sqrt{n}v})$ $(75,1)(w) = \Delta(\frac{w-n}{n}) \cdot (1-(1-v)v)$ $(75,1)(w) = \frac{1}{2}inv \Delta(\frac{w-n}{n})$ When $[n=-1]$ $Same steps as [n=1], but flip signs (75,-1)(v) = -\frac{1}{2}inv \Delta(\frac{w+n}{n})$
When $[n=1]$ $(J_{S,1}(j\omega) = 0.5 \Delta \left(\frac{\omega-\pi}{\pi}\right) \cdot (J_{+}(-1)^{\dagger} e^{-J\pi \tau})$ $(J_{S,1}(j\omega) = \Delta \left(\frac{\omega-\pi}{\pi}\right) \cdot (J_{-}(-1)^{\dagger} e^{-J\pi \tau})$ $(J_{S,1}(j\omega) = \Delta \left(\frac{\omega-\pi}{\pi}\right) \cdot (J_{-}(-1)^{\dagger} \pi \tau)$ $(J_{S,1}(j\omega) = \frac{1}{2} j\pi \tau \Delta \left(\frac{\omega-\pi}{\pi}\right)$ $(J_{S,1}(j\omega) = \frac{1}{2} j\pi \tau \Delta \left(\frac{\omega-\pi}{\pi}\right)$ $(J_{S,1}(j\omega) = -\frac{1}{2} j\pi \tau \Delta \left(\frac{\omega+\pi}{\pi}\right)$
$(75,1(jw) = 0.5 \Delta \left(\frac{w-\pi}{\pi}\right) \cdot (1+(-1)^{j}e^{-j\pi\tau})$ $(75,1(jw) = \Delta \left(\frac{w-\pi}{\pi}\right) \cdot (1-e^{-j\pi\tau})$ $(75,1(jw) = \Delta \left(\frac{w-\pi}{\pi}\right) \cdot (1-(1-j\pi\tau))$ $(75,1(jw) = \frac{1}{2}j\pi\tau \Delta \left(\frac{w-\pi}{\pi}\right)$ When $Ln = -1$ $Same steps as n = 1, but flip signs (75,-1(jw) = -\frac{1}{2}j\pi\tau \Delta \left(\frac{w+\pi}{\pi}\right)$
$(75,1()w) = \Delta(\frac{w-\pi}{\pi}) \cdot (1-e^{-j\pi t})$ $(75,1()w) = \Delta(\frac{w-\pi}{\pi}) \cdot (1-(1-j\pi t))$ $(75,1(jw) = \frac{1}{2}j\pi t \Delta(\frac{w-\pi}{\pi})$ $(75,1(jw) = -1)$ When $Ln = -1$ $Same steps as N = 1, but flip signs (75,1-1(tw) = -\frac{1}{2}j\pi t \Delta(\frac{w+\pi}{\pi})$
$G_{5,1}(jw) = \Delta\left(\frac{w-\pi}{\pi}\right) \cdot \left(1 - \left(1 - j\pi V\right)\right)$ $G_{5,1}(jw) = \frac{1}{2}j\pi V \Delta\left(\frac{w-\pi}{\pi}\right)$ When $Ln = -1$ $Same steps as n = 1, but flip signs G_{5,-1}(jw) = -\frac{1}{2}j\pi V \Delta\left(\frac{w+\pi}{\pi}\right)$
$G_{5,1}(jw) = \frac{1}{2} j\pi \nabla \Delta \left(\frac{w-\pi}{\pi} \right)$ When $Ln = -1$ $Same steps as n = 1, but flip signs G_{5,-1}(jw) = -\frac{1}{2} j\pi \nabla \Delta \left(\frac{w+\pi}{\pi} \right)$
When $Ln = -1$ Same steps as $N = 1$, but flip signs $C_{15,-1}(tw) = -\frac{1}{2} \int \Pi \nabla \Lambda(\frac{w + \pi}{3})$
$C_{75,-1}(1w) = -\frac{1}{2} \int \Pi \nabla \Lambda \left(\frac{w \cdot \Pi}{\pi} \right)$
$C_{15,-1}(jm) = -\frac{1}{2}j\pi \nu \Lambda(\frac{\omega_1 \tau_1}{\pi})$ $C_{15,-1}(jm) = -\frac{1}{2}j\pi \nu \Lambda(\frac{\omega_1 \tau_1}{\pi})$
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[(1)] (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (
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b)	
0)	X(s)= ROC: Re \{s\}7-1
	i) F{x(+)e+}
	$y(t) = \chi(t)e^{-t} \rightarrow Y(s) = \chi(s+1)$
	Defermine region of convergence for Yes)
	Refs+13>-1
	Re E 5 3 > -2
	Therefore, the result is:
	Y()w) = [(jw+1)2+5+2(jw+1)]-1)
	ii) F{x(+)e3+3
	$y(t) = x(t)e^{3t} \rightarrow Y(s) = X(s-3)$
	Determine region of convergence for Yes)
	Re{5-337-1
	Re { 53 > 2
	In this case, the region of convergence does not
	include the jw-axis like it did in the previous
	part of the problem. This means we can not
	determine you).
	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
4. a)	$F(s) = \frac{e^{-s}(s+3)}{(s+3)}$
	(5-1)*(5-2)
	Ignore the e's for now, that's easy and can be handled later
	$\frac{(S+3)}{(s-1)^2(s-2)} = \frac{\Gamma_1}{(s-1)^2} \frac{\Gamma_2}{(s-1)} \frac{\Gamma_3}{(s-2)}$
	$(5-1)^{2}(5-2)$ $(5-1)$ $(5-1)$ $(5-2)$
	$\Gamma_3 = \frac{(5+3)}{(5-1)^2}$, $S = 2$ $\rightarrow \Gamma_3 = 5$ $\Gamma_1 = \frac{(5+3)}{(5-2)}$, $S = 1$ $\rightarrow \Gamma_1 = -4$
	$I_1 = (5-2)$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$, $3-1$,
	Now: $(S+3)$ -4 r_2 5 $(S-1)^2(S-2)$ $(S-1)^2$ $S-1$ $S-2$
	Solve rz, s=0
	Solve f_2 , $S=0$ $\frac{3}{2} = \frac{4}{1} f_2 5$ $\frac{7}{2} = -5$
	12 = -5

```
Add back the e-s now, calculations are done
     F(s) = e^{-s} \left[ -\frac{4}{(s-1)^2} - \frac{5}{s-1} + \frac{5}{s-2} \right]
     Simplify this into f(+)

[f(+) = [u(+-1)] . [5e3(+-1) - 4(+-1)e(+-1) - 5e(+-1)]
b) F(s) = 5+4
     F(s) = 1, Xs+4
     \Gamma_1 = \frac{S+4}{(s^2+41)}, S=0 \Gamma_1 = 1
      Solve for numerator (Xs + 4)
      Xs+Y= 5-52 = -5+1
     F(s) = \frac{1}{S} + \frac{(-5-1)}{8^{2}-4}
     Fts) = 1 + 1 5
S 5<sup>2</sup>44 5<sup>2</sup>44
      Simplify this into fet)
      f(+) = [u(+)] , [ = sin(2+) - cos(2+) + 1]
c) F(s) = \frac{1}{(s+1)(s^2+2s+2)}
     F(s) = (5+1+3)(5+1-3)(5+1)
     F(s) = \frac{r_1}{(s+1)} + \frac{r_2}{(s+1+j)} + \frac{r_3}{(s+1+j)}
     \Gamma_1 = \frac{1}{s^2+2s+2}, s = -1 \rightarrow r_1 = 1

\Gamma_2 = (s+1)(s+1-3), s = -1-3 \rightarrow r_2 = -\frac{1}{2}
      rz = - 1 as well
      f(t) = u(t) \cdot [-\frac{1}{2}e^{-(1+j)t} - \frac{1}{2}e^{-(1-j)t} + e^{-t}]

f(t) = [u(t)] \cdot [e^{-t}(1-\cos(t))]
```

5.	$\frac{d^{2}y(t)}{dt^{2}} + 3 \frac{dy(t)}{dt} + 2 y(t) = ax(t)$	13
	dt2 dt 12/01-01-0	
	a: constant input: e+ -> output: \frac{1}{2}e+	
a)		
	52 Yes) + 35 Yes) + 27(5) = a Xes)	and the state of t
	$H_1(s) = \frac{\gamma(s)}{\chi(s)} \longrightarrow \frac{\alpha}{s^2 + 3s + 2}$ (e) ell (e) de (e) de	
	H ₁ (s) = (5+2)(5+1)	
	Based on the given input/output pair, we know that we	
	can use the Eigenfunction property	-1
	$X(t) = e_{2t}$	
	$\gamma(t) = H(s)e^{st}$	
	y(+) = / H(s)/ · [e s++)(cH(s))]	
	H,(s), s=1 -> ½	
	1 = 9	E.S.
	2 (512)(511)	
	$\frac{1}{2} = \frac{\alpha}{6} - 7 \alpha = 3$	THE RESERVE OF THE PERSON OF T
	H1(s) = (542)(541)	
11	x(t) = u(t)	
9)	Find Laplace Transform of y(t)	
	Y(s) = H,(s) X(s)	Market Control
	$\frac{3}{5(5+2)(5+1)} = \frac{7}{5} \cdot \frac{7}{5+2} \cdot \frac{7}{5+2}$	
	$\Gamma_1 = \frac{3}{(5+2)(5+1)}, S=0 \rightarrow \Gamma_1 = \frac{3}{2}$	4
	$r_2 = \frac{3}{5(5+2)}$, $5 = 1$ $\rightarrow r_2 = -3$	
	$r_3 = \frac{3}{5(5+1)}$, $s = -2$ -> $r_3 = \frac{3}{2}$	
	Combine all this together	
	y(t) = [u(t)] · [3 e-2t-3e-+3]	
	Language And Administration of the Committee of the Commi	
4	the commence of the second	

c) S_2 input: $u(t) \rightarrow output: r(t)$ $H_2(s) = \frac{2(r(t))}{2(u(t))}$

H2(s) = 1/5

Hcs) = H1(s). H2(s)

 $H(s) = \frac{3}{s(s+2)(s+1)}$

Simplify. [Note, this is same calculation as 5b] h(t) = [ult)]. [\frac{2}{2}e^{-2t} - 3e^{+} + \frac{3}{2}]

100 (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (10) (1

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