	ELEG 305
	SOLUTIONS TO EXAM #3 (5/11/17)
*1,	a) d= q(t) = x(t) + dx(t)
	W.Z.
	<u> </u>
	$5^{2}Y(5) - 9Y(5) = X(5) + 5X(5)$ $(5^{2} - 9)Y(5) = X(5)(5+1)$
	$\frac{1}{1}$ $\frac{1}$
	b) poles: H(s) -> 0 S=-3, S=3 Zeros: H(s) -> 0 S=-1, S= 0
	Imisi 5-plane
	-3 -a -1 2 3 Re{s}
	a.) H(5) is rational
	Rets 3 Rets 4-3 -32 Rets 4-3
	-3 3 3 3 3
<u>()</u>	rightmost pole left of strip bounded by notes
	The state of the s
	right-sided signal left-sided signal two-sided signal

#7. cont'd	d.) h(+) = ? (for stable system)
	H(5) = 5+1 $PFE A B (5+3)(5-3) 5+3 5-3$
The second secon	A = H(5)(5+3) = 5+1 = -2 = 1 $5=-3 = 5-3 = -6 = 3$
	B= H(5)(5-3) = S+1 = 4 = 2 5=3 S+3 = 3 6 3
	$\frac{1}{5} + \frac{1}{5} = \frac{1}{3} + \frac{3}{3} = \frac{3}{3}$
	For a stable system, the RIC must contain the jw-axis (Founer transform must exist). This is only true for -3< Refs (43, and corresponds to a two-sided signal, with
	$H(5) = \frac{1}{3} + \frac{3}{3}$ $5+3 + 5-3$
	corresponds corresponds to RS signal to LS signal with Ress >-3 with Ress 43
	: $h(t) = \frac{1}{3} e^{-3t} u(t) - \frac{3}{3} e^{3t} u(t)$
	e.) A causal system is one for which h(t) = 0 for t<0, i.e., a right-sided signal. So, Re[s] > 3.
	and the second s

<u>#</u> a.	Disorete-time LTI system with impulse response $h(n) = \left(\frac{1}{4}\right)^n u[n] + \frac{4}{3}\left(\frac{1}{3}\right)^n u[-n-1]$
	[n] - (1) 185n7 + 4 / 1/n (n)
	(4) (3) (1)
	right sided left sided sequence
	sequence sequence
	a) H(2) = Z{h[n]}
	$= \frac{7}{2} \left\{ \left(\frac{1}{4} \right)^n u[n] + \frac{7}{2} \left(\frac{1}{3} \right)^n u[-n-i] \right\}$
	$= \underbrace{\begin{cases} 1 \\ 1 \\ 4 \end{cases}}^{n} \underbrace{\begin{cases} 1 \\ 2 \\ 4 \end{cases}}^{n} \underbrace{\begin{cases} 1 \\ 3 \\ 2 \\ 3 \end{cases}}^{n} \underbrace{\begin{cases} 1 \\ 3 \\ 2 \\ 4 \end{cases}}^{n} \underbrace{\begin{cases} 1 \\ 3 \\ 2 \\ 4 \end{cases}}^{n} \underbrace{\begin{cases} 1 \\ 3 \\ 2 \\ 3 \\ 2 \end{cases}}^{n} \underbrace{\begin{cases} 1 \\ 3 \\ 2 \\ 3 \\ 2 \\ 3 \\ 3 \\ 3 \\ 3 \\ 3 \\ 3$
	n=0 (4) (3) (3) (3)
	$= \frac{2(12^{-1})^n + 1}{2(32)^m}$
1	N=0 $N=0$ $N=0$ $N=1$ $N=0$
	- H3 (3Z) 1-4Z ⁻¹ 1-3Z
	112-11
	1421 1 1021
	121>4 A (2) < 3
	1-42-1 3 1-37 and
	by 32
	= 1 + 2-1 + 3 11
	1-42-1 3 32-1
	1-42-1 3 1-32-1
	= 1-32-1-3+32-1
	(1-42-1)(1-32-1)
1	

22 a. conte	$H(z) = -\frac{1}{3}$
***************************************	1-首至1+首之-3
	ROQ: 4<121<3
-	6) H(Z) = -1/3 1-7az-1+1az-3
** According to the second sec	= - = - = - = - = - = - = - = - = - = -
THE REST OF THE PROPERTY OF TH	29-132+13
	$= -\frac{1}{3} \frac{2^{2}}{2^{2}}$
~	poles: H(2)→0 Z=4, Z=3 Zeros: H(2)→0 Z=0, Z=0
	2enos: H(2)→0 Z=0, Z=0
	z-plane
	44 243
Tallian Commission of the Comm	
	C) $H(2) = \frac{Y(2)}{\chi(2)} = \frac{-1/3}{1 - \frac{7}{3}z^{-1} + \frac{1}{3}z^{-3}}$
	入(2) 1- 每2-1+ 每2-3
	$Y(2)\left(1-\frac{7}{12}z^{-1}+1z^{-3}\right)=-\frac{1}{3}\chi(2)$
	# Z-1
	$y[n] - \frac{7}{12}y[n-1] + \frac{1}{12}y[n-a] = -\frac{1}{3}x[n]$
	0 10 120 - 3 - 2

ta. contid	d.) The Founer transform of h(n) does not exist
	because the RDC does not gordoin the
	unit airde.
	e.) The system is not causal because the ROC
	also see this directly by looking at h(n].
	also see this directly by looking at h(n).
	the State in to be causal hin must be
	0 for nko, which is not the case here.
#3,	(1) (1) (1) (1) (1)
	a) w h(t) = et u(t) H(s) = (et e st dt)
	i di
	0 (00 - (5-1) t dt
	Je dt
	= - Re454>1
	5-1
	This system is not stable (Init) ldt -> 0
	· Shitlet -> 0
	Poc does not contain ju-axis
-	w) From the feedback structure,
	Y(s) = H(s)(X(s) - AY(s))
	Y(s)(1+AH(s)) = H(s)X(s)
	- H(5)
	teed 1+ AH(5)
	- /(S-1)
	1 + A/(5-1)
	5+(A-1)

*3a.confd	To make this system stable, the pole must be moved to the left-half plane
-	be moved to the left-half plane
	A-1 > 0
	~ A>1
Alaman and a second a second and a second an	b) $h(t) = e^{-3t} \sin(4t)$
Manifester commiss, he do set and efforting to commence of the suppose.	= -3t 1 / 4jt -4t
	$= \frac{1}{a_1} \left(\frac{-3t + 4jt}{-3t} - \frac{3t - 4jt}{2} \right) \mathcal{U}(t)$
	W X
	$H(5) = \frac{1}{3} \left[\frac{1}{5+3-4} + \frac{1}{5+3+4} \right]$
0-	
	poles: 5=-3-4; 5=-3+4;
	ROC: Re{s}>-3
	c.) $\chi(t) = e^{-t} d(e^{-(t+i)}u(t+i))$
	Let x, lt) = e ut).
	Then, $X_1(5) = 1$ Re $\{5\} > -1$
	Let Na(t) = e - (texi) = (x, (t+1)
	Thon, X2(5)= e 1, Re(5/>-1
	(poperty 9.5-2)
	The second secon

\$3.0.00ntd	Let N3(t) = St Nalt). Then,
	Let $N_3(t) = 3t N_3(t)$. Then, $X_3(5) = 5 X_3(5) = e^{5} 5 Re{5} > -1$ (more $x_1, y_1, y_2, y_3, y_4, y_5, y_7)$
	(property 9.5.7) Sti
	Finally $\chi(t) = e^{-t} \chi_3(t)$. Using property 9.5.3, with a shift $5_0 = 1$, we get
	with a shift so -1, we get
	X(5)= X3(511) = S+1 S+1, Re(5)>-2
	5+2
	d) Use the Intral and Final Value Theorems
	u u t
Z** \	Introl Value h(0) = lim 5 H(5) Theorem 5-20
	$\frac{1 \text{ Newrem } 5^{3} New$
	5-9a 53+57+35+2
	$= \lim_{s \to \infty} \frac{-3 + \frac{3}{5^2}}{5 + \frac{3}{5^3} + \frac{3}{5^3}}$
	= = 3
	(u) httl ast = 20 m httl = 1im stt(s) Final Value to 20 5-20
	Theorem = $\lim_{n \to \infty} -35^3 + 35$
	570 53+5+35+2
1	

#4.	Disorde-time LTI system with
	$H(z) = \frac{1}{2}z$
**************************************	H(Z) = Z ² Z ² + §Z-1
-	1+ =
1	(1-32-1)(1+32-1)
Agramatica () processor franchis extension of	
The security of miles developed up, from a major particular paper of a	poles = = 1/3, Z=-3
-	· ROC#1: Outside Her outside + a) 17/27
	· ROC#1: outside the outermost pole 12/>3
	X 1/3
-	- 100 to 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
	· ROC#a: inside the innermost pole 12/43
	-3 V/3
	3 (3
1	
Andrews of the second s	
	,

#4 apont'd)	· ROC # 3: ring bounded by poles 3<121<3
	contained in noc
	-3 (/ / / / / / / Sta)a)a
	-3/1//X 5table
Salva Cradit	ether 1/2 or 1/2
-7	nother and
	lest-half plane stop in s plane
	a) left-sided signal? Yes. This is one possibility because the ROC must contain the juraxis.
	b.) right-sided signal? No. The ROC must be to the left of 5= 1/2 to contain the jui-axis
	c.) two-sided signal? Yes. See the ROC on the Vight above.