ECE 4522	EXAM NO. 2	Spring'2016
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Problem	Points	Score
1(a)	10	
1(b)	10	
1(c)	5	
1(d)	5	
1(e)	5	
1(f)	5	
2(a)	15	
2(b)	15	
3(a)	10	
3(b)	10	
3(c)	10	
Total	100	

Notes:

- (1) The exam is closed books and notes except for one double-sided sheet of notes.
- (2) Please indicate clearly your answer to the problem.
- (3) If I can't read or follow your solution, it is wrong and no partial credit will be awarded.

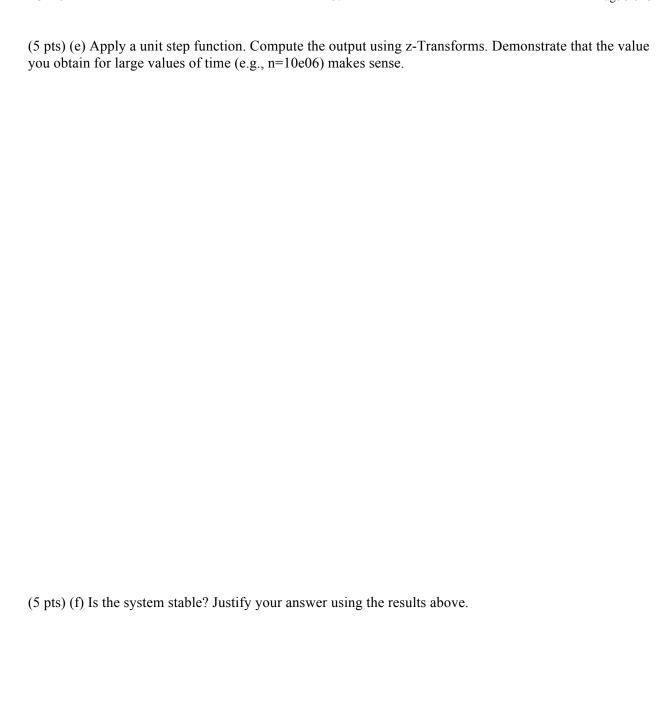
Problem No. 1: Consider the linear time-invariant constant coefficient difference equation: y[n] = 0.5y[n-2] + 0.25x[n-1]. Assume the initial conditions are zero.

(10 pts) (a) Compute the z-Transform.

(10 pts) (b) Find the impulse response by taking the inverse z-Transform.

(5 pts) (c) Apply an impulse function to the difference equation and compute the impulse response.

(5 pts) (d) Demonstrate that the answers to (b) and (c) match.



Problem	Nο	2.	Assuming	a	sample	frequency	of 8 kF	17.
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(15 pts) (a) Design a second-order digital resonator such that resonant frequency is 500 Hz and the 3 dB bandwidth is 100 Hz.

(15 pts) (b) Plot the location of the poles of this filter in the z-plane.

Problem No. 3: A linear system is described by the difference equation:

$$v[n] = x[n] + v[n-1]$$

$$y[n] = v[n] + v[n-2] + v[n-4]$$

(10 pts) (a) Determine the transfer function.

(10 pts) (b) Draw the direct form realization.

(10 pts) (c) Draw the canonical realization.