CS 6420	Topics in Image Processing and Multimedia	Test 1
Name:	Spring 2017	Max Pts: 58

Important: This is an open book test. You can use any books, notes, or paper but no electronic device, except a non-programmable calculator. *Do not log into the computer during the test, or use any electronic or communications device. Change your cell phones to silent mode*. Any calculations and rough work can be done on the back side of the test pages. Please write legibly; if I cannot read what you write, I'll give you a zero. You will lose five points for not writing your name.

1. [18 pt] Given the sequence $f(n) = \{0, 0.5, 0.25, 1\}$ where $n = 0, 1, 2, 3$, compute:

   (a) The sign-reversed sequence

   (b) The order-reversed sequence

   (c) The modulated sequence

   (d) The modulated and then order-reversed sequence

   (e) The order-reversed and then modulated sequence

   (f) Does the result from (d) or (e) correspond to the equation

   $$h(n) = (-1)^n f(K - 1 - n)$$

   where K is the length of the impulse response.

2. [20 pt] Consider an 8-pixel line of intensity data, $\{108, 139, 135, 244, 172, 173, 56, 99\}$. If it is uniformaly quantized with 4-bit accuracy, compute the RMS error and RMS signal-to-noise rates for the quantized data.

3. [10 pt] Erosion of a set A by structuring element B is a subset of A as long as the origin of B is contained by B. Give an example in which the erosion $A \ominus B$ lies outside, or partially outside, A.

4. [10 pt] Describe step, ramp, and roof edges. What is their response to first and second derivatives?