

## Quiz I – CS B

### EE402 Digital Image Processing - spring 2018

Time Allowed: 15 mins

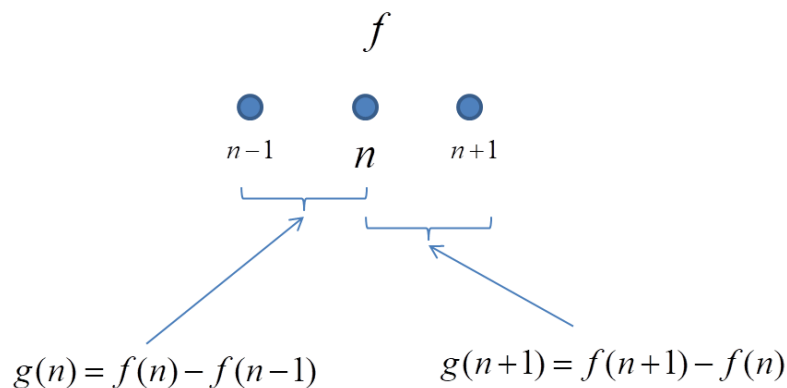
**Instructions: There is only 1 problem in this exam. You can use your notes and books.**

Problem 1: We want to design a filter for calculating 2<sup>nd</sup> derivative of an image (in  $x$  direction only), just as we made a filter to find 1<sup>st</sup> derivative. Assume that the first derivative can be found by taking the following difference:

$$g(n) = f(n) - f(n-1)$$

$$g(n+1) = f(n+1) - f(n)$$

as illustrated in figure.



We can find the 2<sup>nd</sup> derivative  $h(n)$  by applying the same rule on  $g$

**Find a 3 x 3 kernel that when applied to image  $f$ , calculates its second horizontal derivative.**  
You can begin by writing  $h(n)$  in terms of  $f$ .

