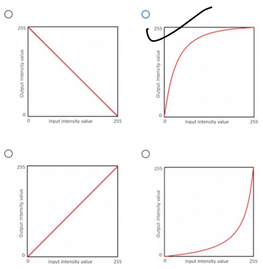
1. If you wanted to make an image look brighter than what it currently does, which one of the following intensity transformations would you use?



2. The mean and standard deviation of pixel intensity values in an 8-bit gray-scale image are 120 and 10, respectively. What are the mean and standard deviation of pixel intensity values in the negative of this image?

256 - 120 = 135

- 135, 10
- 120, 10
- 110, 20
- They can't be determined without knowing the size of the image.

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3. Check all statements that are true regarding image histogram equalization:

- [x] After histogram equalization, the intensity values are more effectively distributed over the histogram range.
- [ ] The mean intensity value of the pixels in an image increases after histogram equalization.
- [ ] After histogram equalization images will always look brighter.
- [ ] If pixel p is the brightest pixel in image x, it will remain the brightest pixel after histogram equalization.

Q4.

Find point transformation $z = H(r)$

	raw	specific	
k	r_k	n_k	s_k
0	0	148	498
1	$\frac{1}{6}$	300	550
2	$\frac{2}{6}$	500	600
3	$\frac{3}{6}$	2200	800
4	$\frac{4}{6}$	500	600
5	$\frac{5}{6}$	300	550
6	1	148	498

$\frac{0}{6} = 0$

$\frac{1}{6} \approx 0.167$

$\frac{2}{6} \approx 0.333$

$\frac{3}{6} = 0.5$

$\frac{4}{6} = 0.666$

$\frac{5}{6} \approx 0.833$

$\frac{6}{6} = 1$

$z = H(r) = G^{-1}T(r)$

$T(r)$

$T(0) = \frac{148}{4096} = 0.036 \approx 0$

$T(\frac{1}{6}) = \frac{148+300}{4096} = 0.11 \approx \frac{1}{6}$

$T(\frac{2}{6}) = \frac{148+300+500}{4096} = \frac{948}{4096} \simeq 0.23 \simeq \frac{1}{6}$

$T(\frac{3}{6}) = \frac{148+300+500+2200}{4096} = \frac{3148}{4096} = 0.77 \approx \frac{5}{6}$

$T(\frac{4}{6}) = \frac{148+300+500+2200+500}{4096} = \frac{3648}{4096} \simeq 0.9 \simeq \frac{5}{6}$

$T(\frac{5}{6}) = \frac{148+300+500+2200+500+300}{4096} = \frac{3948}{4096} \approx 1$

$T(\frac{6}{6}) = 1$

Summary

$T(0) = 0$
$T(\frac{1}{6}) = \frac{1}{6}$
$T(\frac{2}{6}) = \frac{1}{6}$
$T(\frac{3}{6}) = \frac{5}{6}$
$T(\frac{4}{6}) = \frac{5}{6}$
$T(\frac{5}{6}) = 1$
$T(\frac{6}{6}) = 1$

$G(0) = \frac{498}{4096} \Rightarrow \frac{1}{6}$

$G(\frac{1}{6}) = \frac{498+550}{4096} = 0.256 \rightarrow \frac{2}{6}$

$G(\frac{2}{6}) = \frac{498+550+600}{4096} = 0.402 \rightarrow \frac{2}{6}$

$G(\frac{3}{6}) = \frac{498+550+600+800}{4096} = 0.597 \rightarrow \frac{3}{6}$

$G(\frac{4}{6}) = \frac{498+550+600+800+600}{4096} = 0.744 \rightarrow \frac{4}{6}$

$G(\frac{5}{6}) = \frac{498+550+600+800+600+550}{4096} = 0.878 \rightarrow \frac{5}{6}$

$G(\frac{6}{6}) = 1$

$G(0) = \frac{1}{6}$
$G(\frac{1}{6}) = \frac{2}{6}$
$G(\frac{2}{6}) = \frac{2}{6}$
$G(\frac{3}{6}) = \frac{3}{6}$
$G(\frac{4}{6}) = \frac{4}{6}$
$G(\frac{5}{6}) = \frac{5}{6}$
$G(\frac{6}{6}) = \frac{6}{6}$

Then

$G^{-1}(\frac{1}{6}) = 0$ ✓

$G^{-1}(\frac{2}{6}) = \frac{1}{6}$
$G^{-1}(\frac{3}{6}) = \frac{2}{6}$

$G^{-1}(\frac{4}{6}) = \frac{3}{6}$
$G^{-1}(\frac{5}{6}) = \frac{4}{6}$
$G^{-1}(\frac{6}{6}) = \frac{5}{6}$ ✓
$G^{-1}(\frac{6}{6}) = \frac{6}{6}$ ✓

Finally

$G^{-1}(T(0)) = 0$
$G^{-1}(T(\frac{1}{6})) = G^{-1}(T(\frac{2}{6})) = G^{-1}(\frac{1}{6}) = 0$
$G^{-1}(T(\frac{3}{6})) = G^{-1}(T(\frac{4}{6})) = G^{-1}(\frac{5}{6}) = \frac{5}{6}$
$G^{-1}(T(\frac{5}{6})) = G^{-1}(\frac{6}{6}) = \frac{6}{6}$

Q5.

```
clear all
I=[8 1 2 1 7
    9 3 10 4 0
    1 5 10 9 8
    9 10 5 8 9];
M=[0 0 1 0 0
    0 0 1 0 0
    1 1 1 1 1
    0 0 1 0 0
    0 0 1 0 0];
convolvedImage = conv2(I, M, 'same')
```

```
convolvedImage = 4×5
    21    20    39    24    18
    40    42    43    35    38
    42    39    50    45    43
    34    40    61    45    30
```