

# CSE 107 - HW #3

$$H[a_1 f_1(x, y) + a_2 f_2(x, y)] = a_1 H[f_1(x, y)] + a_2 H[f_2(x, y)]$$

- Let  $S_1 = \{1, -3, 3\}$
- $S_2 = \{5, 6, 7\}$

$$a=b=1$$

- $H(S_1 + S_2) = \text{median}(6, 3, 10) = 3, 6, 10 = 6$

- $H(S_1) = \text{median}\{-3, 1, 3\} = 1$

- $H(S_2) = \text{median}\{5, 6, 7\} = 6$

$\rightarrow 7 \neq 6$

\* Since  $7 \neq 6$ , this means that the linearity definition is not satisfied and proves that the median is a nonlinear operator.

2- • No, 2 affine transformations do not give the same result; this is the counterexample

- $T_2$  is translation matrix in  $x$  direction by 1 unit.

- $T_1$  be rotation matrix in  $y$  direction by a  $45^\circ$  angle.

