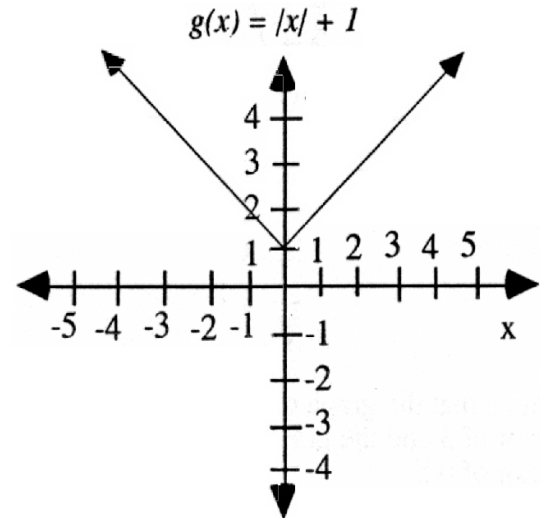
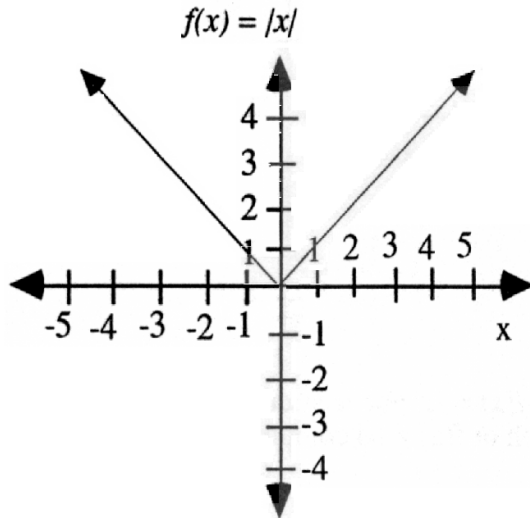


SHIFTING, STRETCHING AND REFLECTING GRAPHS

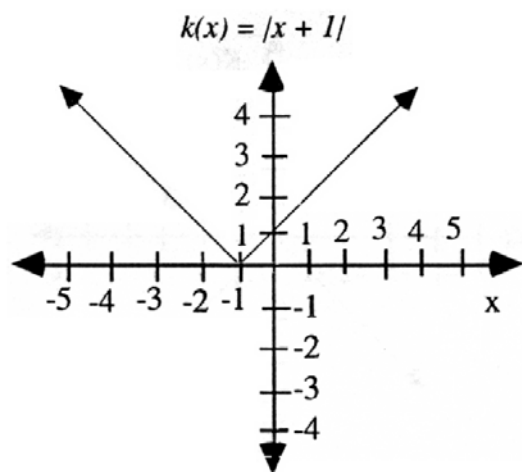
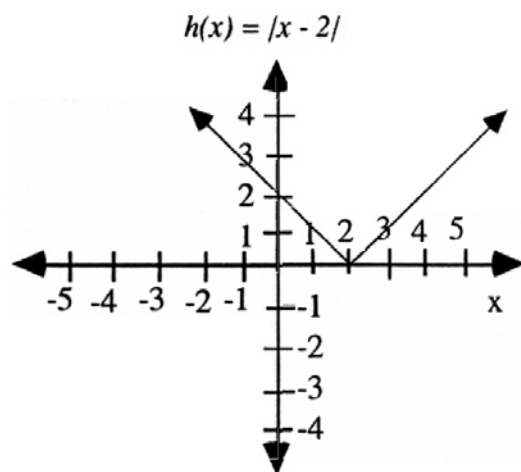
I. VERTICAL AND HORIZONTAL SHIFTING:

Example 1: Sketch the graph of $f(x) = |x|$ and $g(x) = |x| + 1$.



Notice that the graph of $g(x) = |x| + 1$ is just the graph of $f(x) = |x|$ shifted upward by 1 unit.

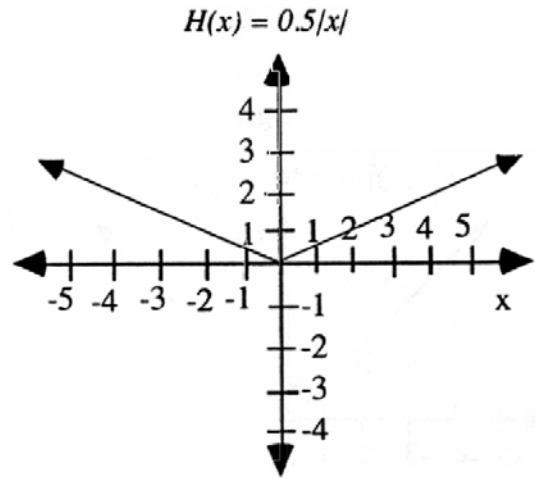
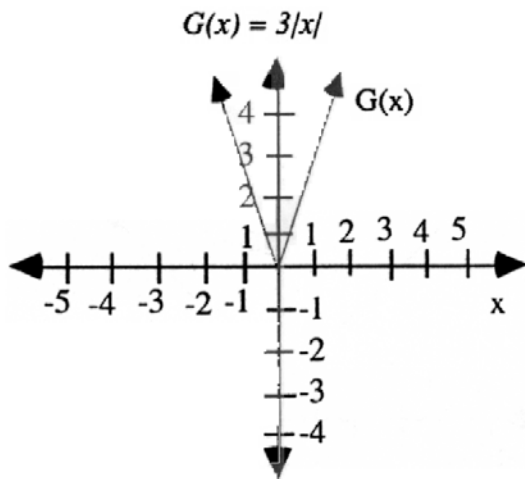
Example 2: Sketch the graph of $h(x) = |x - 2|$ and $k(x) = |x + 1|$.



Notice that the graph of $h(x) = |x - 2|$ is just the graph of $f(x) = |x|$ shifted to the right by 2 units and the graph of $k(x) = |x + 1|$ is just the graph of $f(x) = |x|$ shifted to the left by 1 unit.

II. STRETCHING AND COMPRESSING GRAPHS:

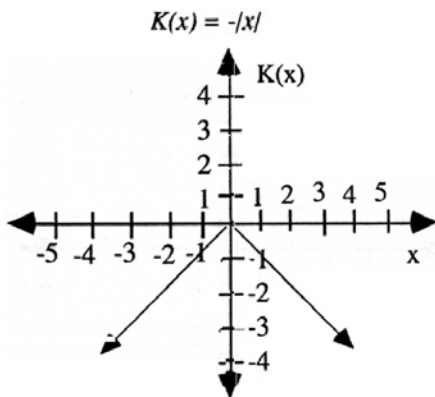
Example 3: Sketch the graph of $G(x) = 3|x|$ and $H(x) = 0.5|x|$.



Notice that the graph of $G(x) = 3|x|$ is just the graph of $f(x) = |x|$ above stretched vertically by a factor of 3 and the graph of $H(x) = 0.5|x|$ is just the graph of $f(x) = |x|$ compressed vertically by a factor of 0.5.

III. REFLECTING GRAPHS:

Example 4: Sketch the graph of $K(x) = -|x|$.



Notice that the graph of $K(x) = -|x|$ is just the graph of $f(x) = |x|$ above reflected about the x-axis.

IV. THE RULES:

A function in the form of $F(x) = a[f(x - h)] + k$ will be
shifted k units **up** if $k > 0$
shifted k units **down** if $k < 0$

shifted h units to the **right** if $h > 0$
shifted h units to the **left** if $h < 0$

stretched vertically if $|a| > 1$

compressed vertically if $0 < |a| < 1$

reflected about the x-axis if $a < 0$

V. IMPORTANT FUNCTIONS:

Be able to recognize these functions and sketch them.

