Honors Advanced Algebra Name: Key

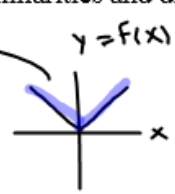
Absolute Value Functions TI-Nspire Activity

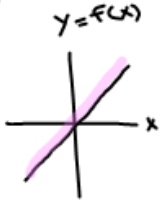
- Graph the following functions on your TI-Nspire calculator and answer all questions.

1. Graph $y = |x|$ and $y = x$ in the same window.

a) How does an absolute value functions compare to a linear function? What are the similarities and differences?

Absolute value "Parent Graph"





Difference : • shape

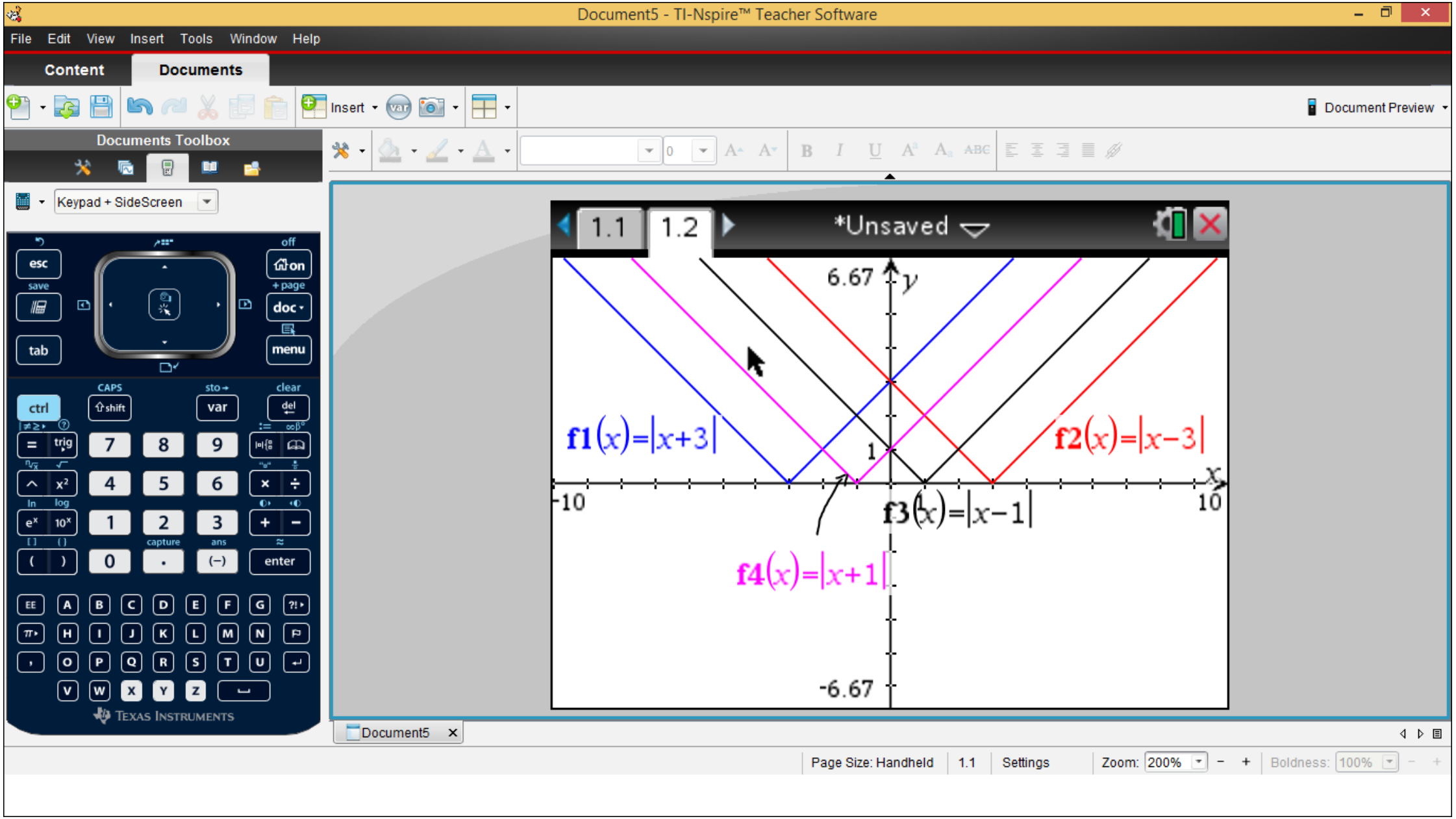
Similarity : • Both have same slope in 1st quadrant
• Both go through (0,0)

2. Graph the following functions in the same window:

$y = |x + 3|$
$y = |x - 3|$
$y = |x + 1|$
$y = |x - 1|$

} Look at graphs on next page

b) Compare the graphs. If $y = |x + h|$, how does the value of h change the graph?


Document5 - TI-Nspire™ Teacher Software
File Edit View Insert Tools Window Help
Content Documents
Insert
Document Preview
Documents Toolbox
Keypad + SideScreen
1.1 1.2 *Unsaved
6.67
y
f1(x)=|x+3|
f2(x)=|x−3|
1
x
-10
10
f3(x)=|x−1|
f4(x)=|x+1|
-6.67
Document5
Page Size: Handheld
1.1
Settings
Zoom: 200%
Boldness: 100%

2. Graph the following functions in the same window:

$y = |x + 3|$
$y = |x - 3|$
$y = |x + 1|$
$y = |x - 1|$

b) Compare the graphs. If $y = |x + h|$, how does the value of h change the graph?

- h changes the graph by shifting it left or right depending on the #. For example, +3 shifted the graph to left 3, the opposite direction. −1 shifted the graph to right one.

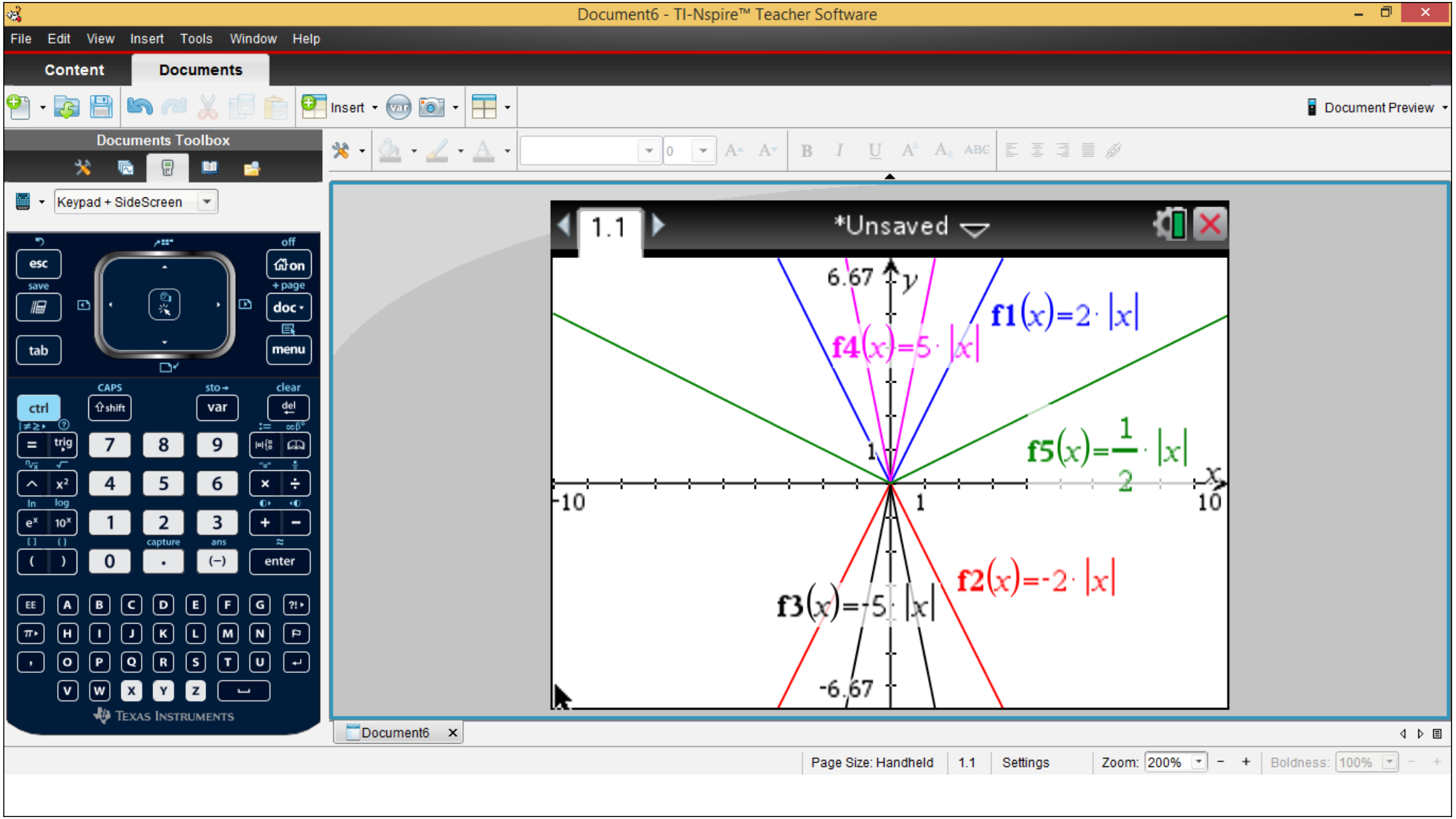
3. Graph the following functions in the same window:

$y = 2|x|$ $y = 5|x|$ $y = \frac{1}{2}|x|$
$y = -2|x|$ $y = -5|x|$

} see graph on next page

c) Compare the graphs. If $y = a|x|$, how does the value of a change the graph?

- a controls "slope"; how narrow or wide the graph gets.
- a > 1 (when a is greater than 1): Graph gets more narrow...
- a < 0 (when a is negative): Graph is reflected over x-axis. It flips!
- 0 < a < 1 (when a is between 0 and 1): Graph gets wider...


Document6 - TI-Nspire™ Teacher Software
File Edit View Insert Tools Window Help
Content Documents
Insert
Document Preview
Documents Toolbox
Keypad + SideScreen
1.1
*Unsaved
6.67
y
f1(x)=2·|x|
f4(x)=5·|x|
f5(x)=1/2·|x|
1
-10
1
10
x
f2(x)=-2·|x|
f3(x)=-5·|x|
-6.67
Document6
Page Size: Handheld
1.1
Settings
Zoom: 200%
Boldness: 100%

4. Graph the following functions in the same window:

$y = |x| + 2$

$y = |x| - 2$

$y = |x| + 4$

$y = |x| - 4$

d) Compare the graphs. If $y = |x| + k$, how does the value of k change the graph.

- k controls shift up or down: shift down means k is negative and shift up mean k is positive

5. The vertex is the point where both of the lines meet in an absolute value graph. It is the maximum or minimum output of the graph. Graph the following functions and write down the vertex point.

$y = |x| + 2$ Vertex =

$y = |x - 3| + 2$ Vertex =

$y = |x - 3| - 4$ Vertex =

$y = |x + 1| - 6$ Vertex =

$y = 2|x + 5| - 1$ Vertex =

Document7 - TI-Nspire™ Teacher Software

File Edit View Insert Tools Window Help

Content Documents

Insert Document Preview

Documents Toolbox

Keypad + SideScreen

1.1 *Unsaved

6.67 y

$f3(x)=|x|+4$

$f1(x)=|x|+2$

$f2(x)=|x|-2$

$f4(x)=|x|-4$

-10 1 10 x

-6.67

Document7

Page Size: Handheld | 1.1 | Settings | Zoom: 200% | Boldness: 100%

5. The vertex is the point where both of the lines meet in an absolute value graph. It is the maximum or minimum output of the graph. Graph the following functions and write down the vertex point.

$y = |x| + 2$ Vertex = $(0, 2)$

$y = |x - 3| + 2$ Vertex = $(3, 2)$

$y = |x - 3| - 4$ Vertex = $(3, -4)$

$y = |x + 1| - 6$ Vertex = $(-1, -6)$

$y = 2|x + 5| - 1$ Vertex = $(-5, -1)$

e) Compare each vertex to its original equation

Do you notice anything?