20. If $f: (x, y) \rightarrow (x + 2y, y)$ for every pair (x, y) in the plane, for what points (x, y) is it true that $(x, y) \rightarrow (x, y)$?

(A) The set of points (x, y) such that $x = 0$
(B) The set of points (x, y) such that $y = 0$
(C) The set of points (x, y) such that $y = 1$
(D) $(0, 0)$ only
(E) $(-1, 1)$ only

$(x,y) \rightarrow (x+2y, y)$

(x, y)

$x+2y = x$

$y = 0$

47. Which of the following shifts of the graph of $y = x^2$ would result in the graph of $y = x^2 - 2x + k$, where k is a constant greater than 2 ?

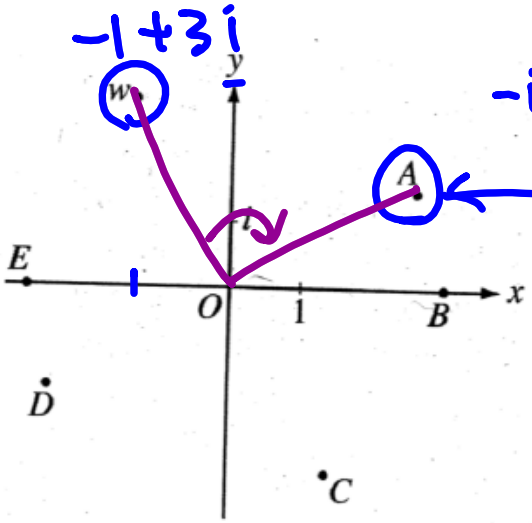
(A) Left 2 units and up k units
(B) Left 1 unit and up $k + 1$ units
(C) Right 1 unit and up $k + 1$ units
(D) Left 1 unit and up $k - 1$ units
(E) Right 1 unit and up $k - 1$ units

(0,0)

$y = x^2 - 2x + 1 + k - 1$

$y = (x-1)^2 + k - 1$

$(1, k-1)$



50. If w is the complex number shown in the figure above, which of the following points could be $-iw$?

(A) A (B) B (C) C (D) D (E) E

$-1+3i$

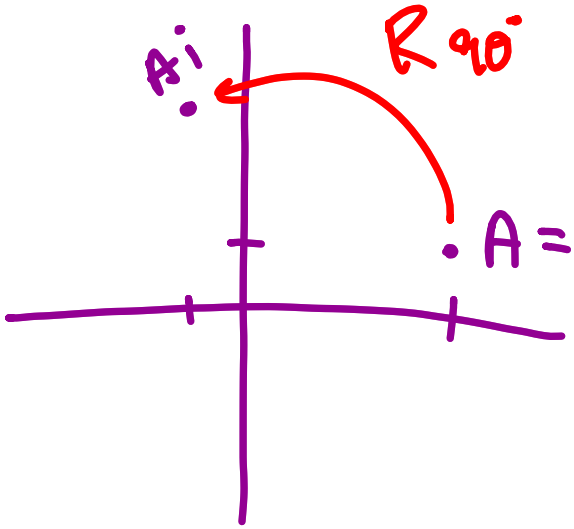
$-iw = i - 3i^2$

$= 3+i$

$-i(a+bi)$

$= b - ai$

$(a, b) \to (b, -a)$



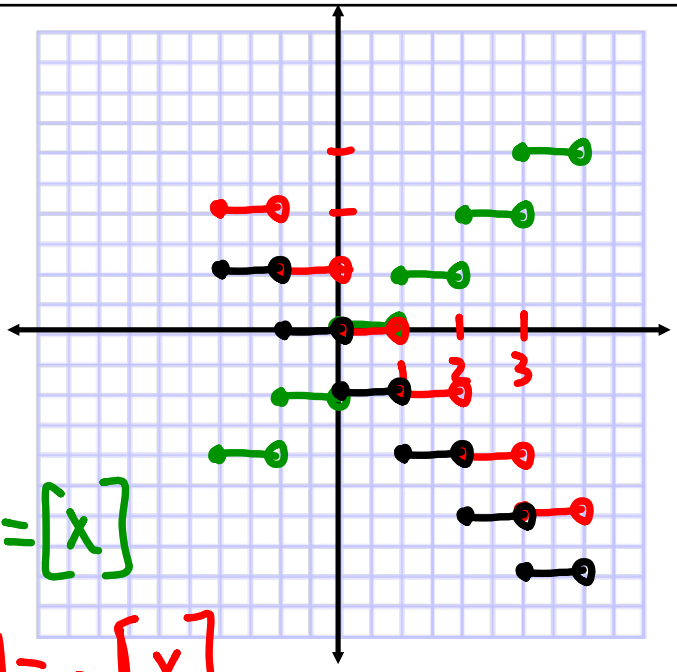
then. what is Ai?

$-1 + 4i$

Sketch

$y = -[x] - 1$

$= -([x] + 1)$



$y = [x]$

$y = -[x]$

5. In the cube determined by $1 \leq x \leq 2$, $1 \leq y \leq 2$, $1 \leq z \leq 2$, determine the maximum numerical value of the function f defined by $f(x,y,z) = xyz - 3yz + 2x - 5$.

$(x-3)yz + 2x - 5$