File Edit View Insert Cell Kernel Widgets Help Trusted Python 3 (ipykernel)

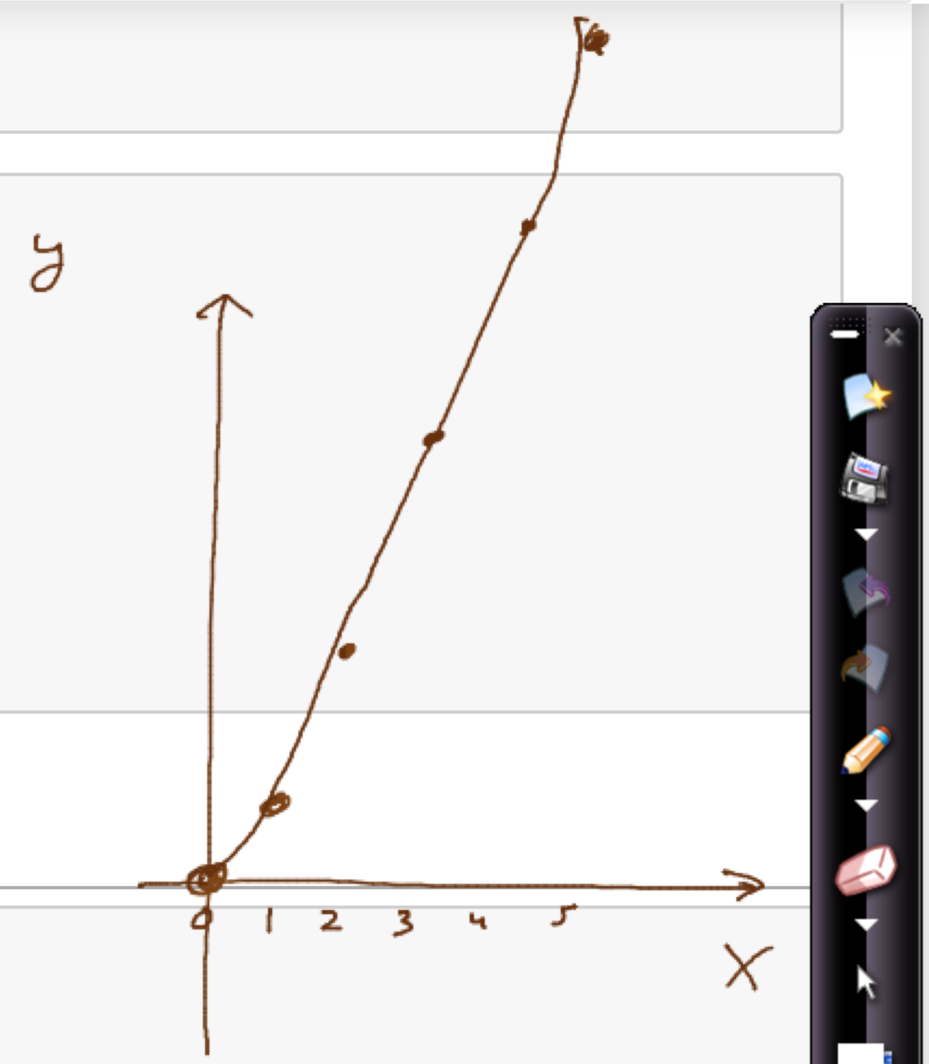
In [1]:
```
def f(x):
    return x**2
```

In [8]:
```
inputs = [0, 1, 2, 3, 4, 5]
outputs = []

# method 1
for x in inputs:
    outputs.append(f(x))

print("Inputs: ", inputs)
print("Outputs: ", outputs)
```

```
Inputs:  [0, 1, 2, 3, 4, 5]
Outputs:  [0, 1, 4, 9, 16, 25]
```



In [9]:
```
# method 2 - using list comprehension
outputs1 = [f(x) for x in inputs]
print(outputs1)
```

```
[0, 1, 4, 9, 16, 25]
```

In [10]:
```
# method 3 - using functional programming - map
outputs2 = list(map(f, inputs))
print(outputs2)
```

```
[0, 1, 4, 9, 16, 25]
```

In [ ]:

1/1

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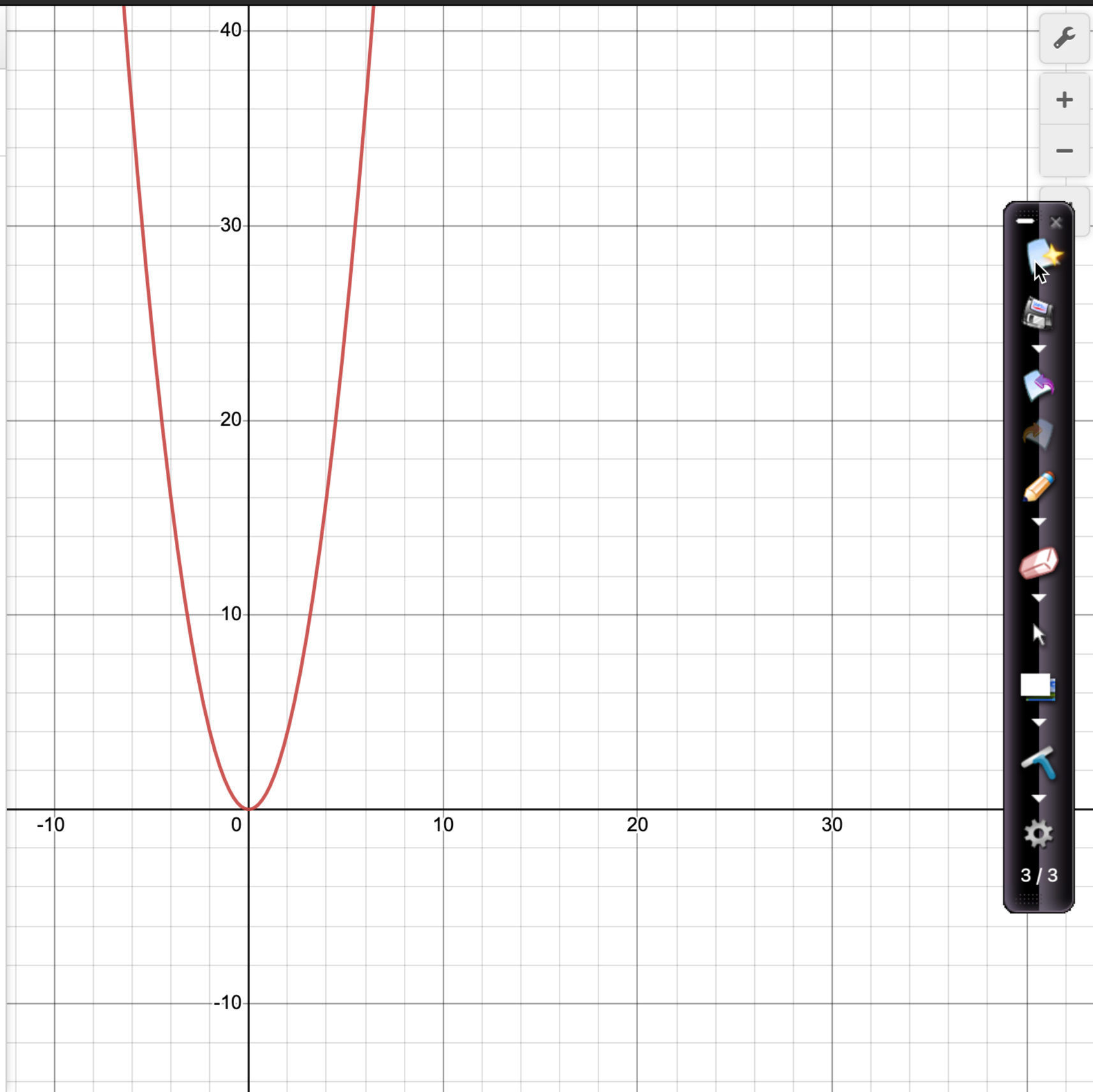
2 / 2

1 $y = x^2$

2



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$y = 2^x$

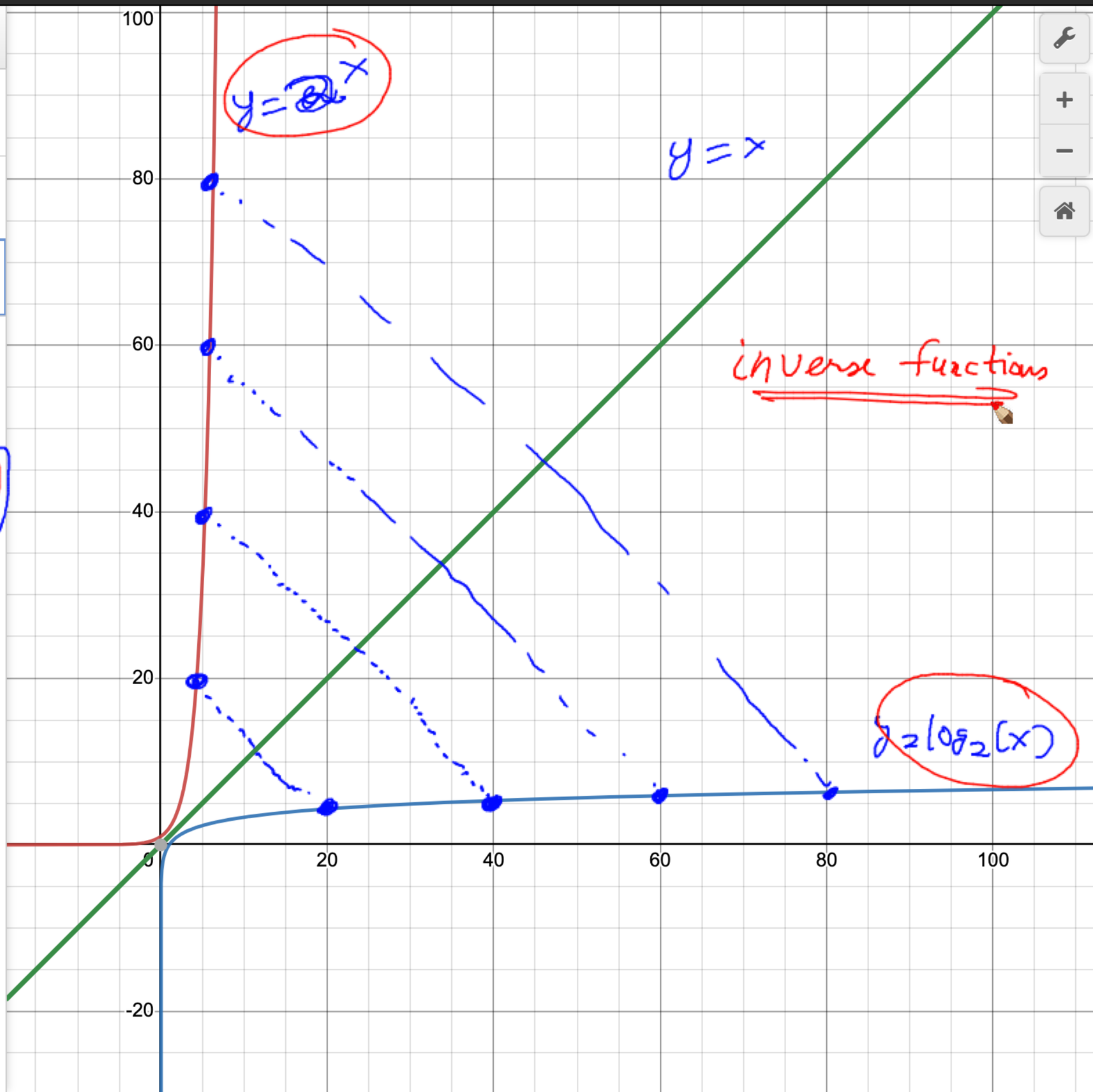
$y = \log_2 x$

$y = x$

$y = 2^7 \Rightarrow y = 2^x$

$\log_2(2^7) = 7$

$\log_2 y = x$



4 / 4

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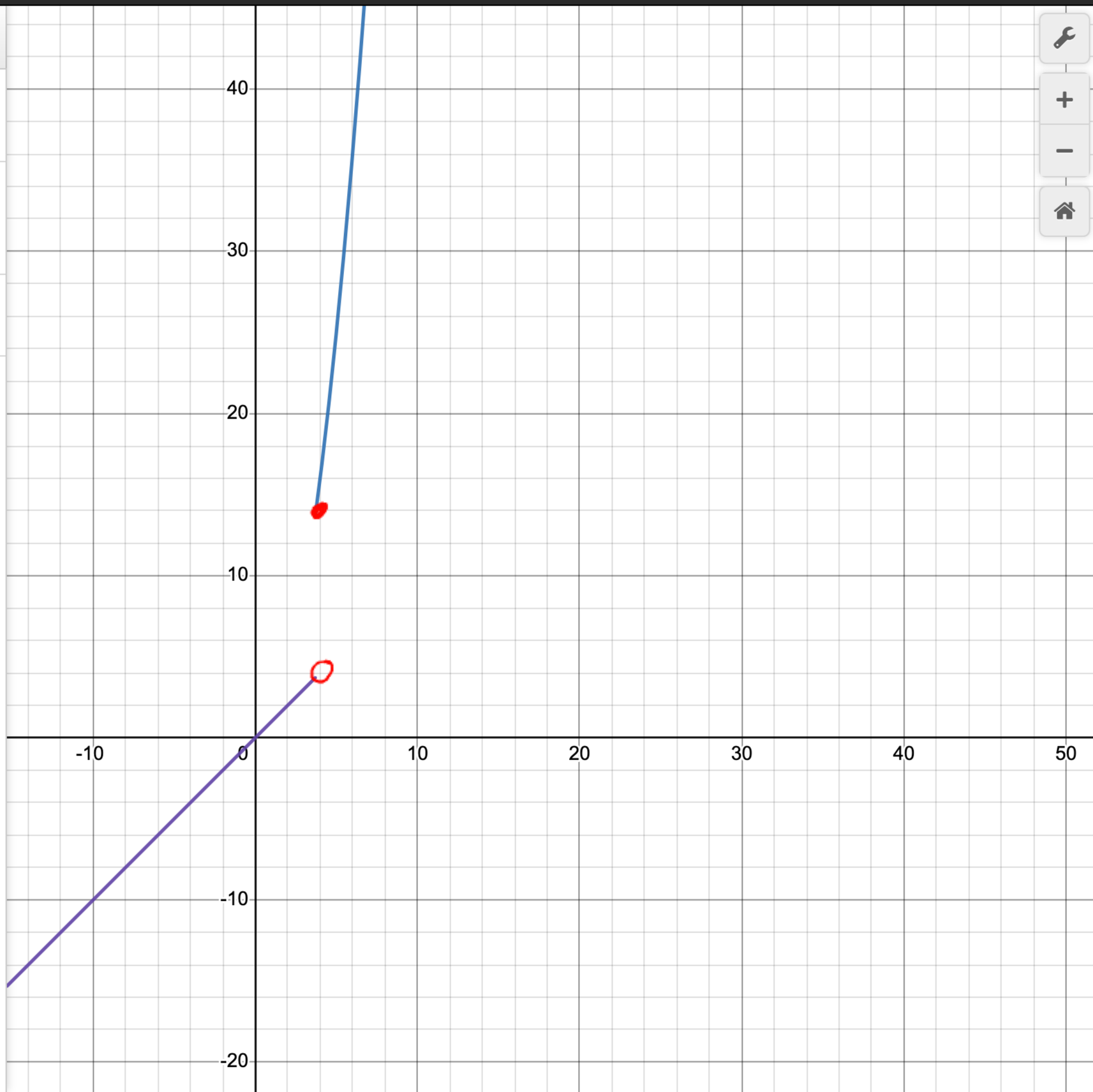
1 $y = \{x \geq a : x^2\}$

2 $a = 3.7$

−10 10

3 $y = \{x < a : x\}$



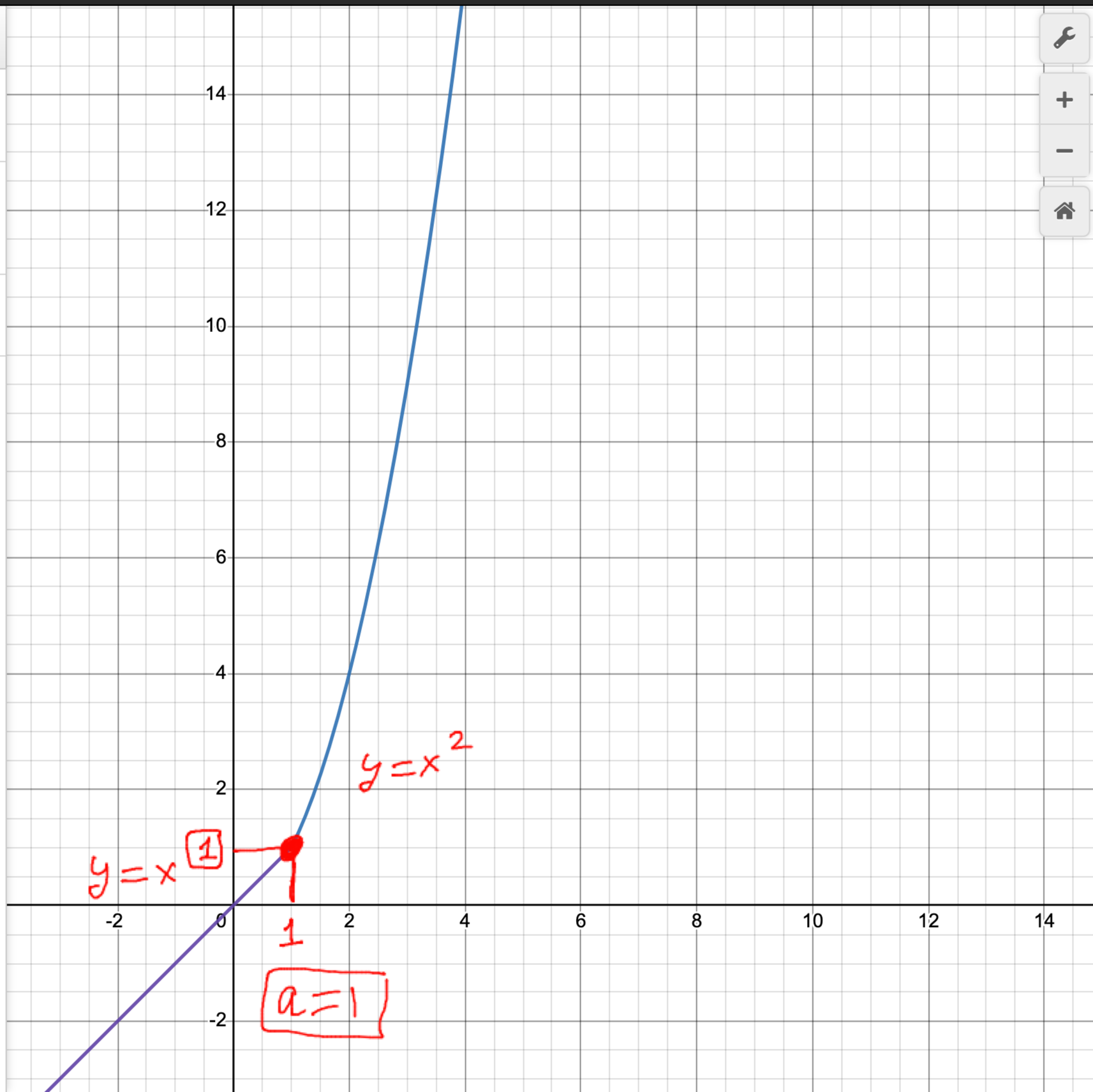
5 / 5

1 $y = \{x \geq a : x^2\}$

2 $a = 1$

−10 10

3 $y = \{x < a : x\}$



6 / 6

```
[0, 1, 4, 9, 16, 25]
```

Limits

In [11]:
```
def f(x):
    if x > 2:
        return x**2
    else:
        return x
```

$$f(x) = \begin{cases} x^2, & x > 2 \\ x, & x <= 2 \end{cases}$$

In [13]:
```
a = 2
left_hand_inputs = [a - i for i in [0.5, 0.1, 0.01, 0.001]]
print(left_hand_inputs)
```

```
[1.5, 1.9, 1.99, 1.999]
```

In [ ]:

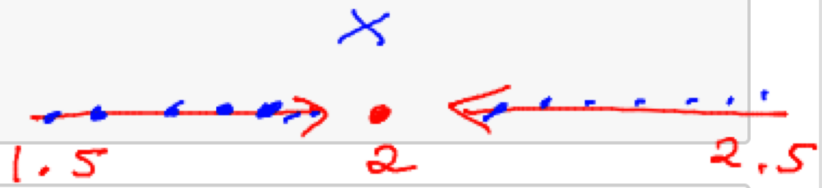
In [ ]:

In [ ]:

In [ ]:

In [ ]:

In [11]:
```
def f(x):
    if x > 2:
        return x**2
    else:
        return x
```



In [16]:
```
a = 2
left_hand_inputs = [1.5, 1.9, 1.99, 1.9999]
right_hand_inputs = [2.5, 2.1, 2.01, 2.0001]

print(left_hand_inputs) # as close to 2 as possible from left side
```

a < 2

a > 2

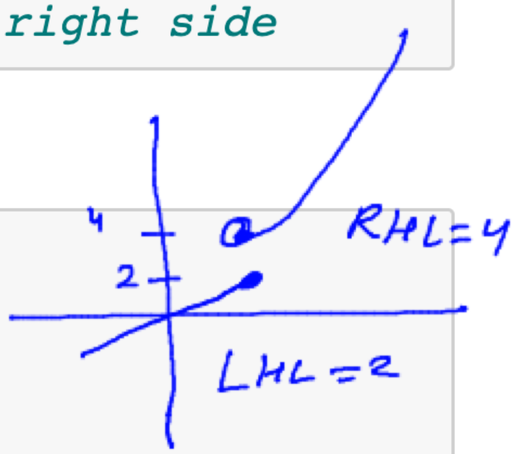
```
[1.5, 1.9, 1.99, 1.9999]
```

In [18]:
```
print(right_hand_inputs) # as close to 2 as possible from right side
```

```
[2.5, 2.1, 2.01, 2.0001]
```

In [19]:
```
left_hand_outputs = [f(x) for x in left_hand_inputs]
right_hand_outputs = [f(x) for x in right_hand_inputs]

print("Left Hand outputs: ", left_hand_outputs)
print("Right hand outputs: ", right_hand_outputs)
```




```
Left Hand outputs:  [1.5, 1.9, 1.99, 1.9999]
Right hand outputs:  [6.25, 4.41, 4.040099999999999, 4.000400010000001]
```

→ 2

→ 4

In [ ]:

Limits again

In [21]:
```
def f(x):
    if x > 2:
        return x**2
    else:
        return x
```

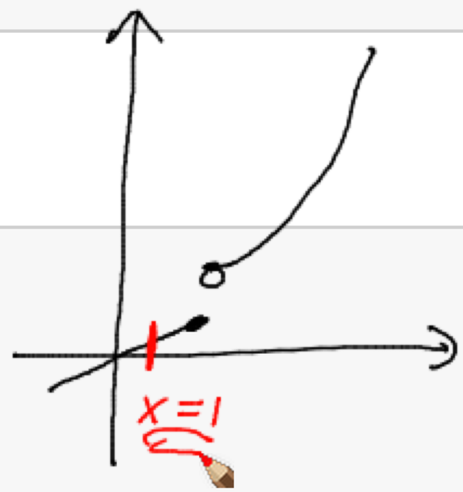
Is the fn continuous?

$$f(x) = \begin{cases} x^2, & x > 2 \\ x, & x <= 2 \end{cases}$$

In [23]:
```
a = 1
left_hand_inputs = [a - i for i in [0.5, 0.1, 0.001, 0.0001]]
right_hand_inputs = [a + i for i in [0.5, 0.1, 0.001, 0.0001]]

print(left_hand_inputs) # as close to 2 as possible from left side
print(right_hand_inputs)
```

```
[0.5, 0.9, 0.999, 0.9999]
[1.5, 1.1, 1.001, 1.0001]
```



In [24]:
```
left_hand_outputs = [f(x) for x in left_hand_inputs]
right_hand_outputs = [f(x) for x in right_hand_inputs]

print("Left Hand outputs: ", left_hand_outputs)
print("Right hand outputs: ", right_hand_outputs)
```

```
Left Hand outputs:  [0.5, 0.9, 0.999, 0.9999]
Right hand outputs:  [1.5, 1.1, 1.001, 1.0001]
```

→ 1

In [ ]:

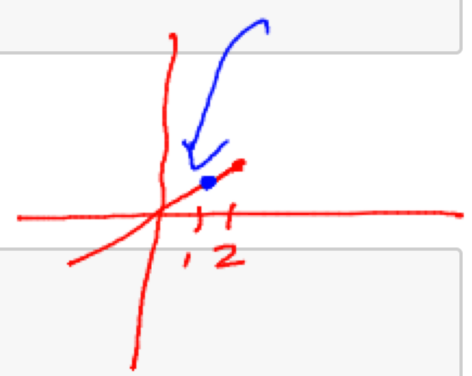
Limits again

In [21]:
```
def f(x):
    if x > 2:
        return x**2
    else:
        return x
```

In [23]:
```
a = 1
left_hand_inputs = [a - i for i in [0.5, 0.1, 0.001, 0.0001]]
right_hand_inputs = [a + i for i in [0.5, 0.1, 0.001, 0.0001]]

print(left_hand_inputs) # as close to 2 as possible from left side
print(right_hand_inputs)
```

```
[0.5, 0.9, 0.999, 0.9999]
[1.5, 1.1, 1.001, 1.0001]
```



In [24]:
```
left_hand_outputs = [f(x) for x in left_hand_inputs]
right_hand_outputs = [f(x) for x in right_hand_inputs]

print("Left Hand outputs: ", left_hand_outputs)
print("Right hand outputs: ", right_hand_outputs)
```

```
Left Hand outputs:  [0.5, 0.9, 0.999, 0.9999]
Right hand outputs:  [1.5, 1.1, 1.001, 1.0001]
```

a = 1

LHL = 1

RHL = 1

at a = 1, Limit = 1

In [ ]:

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1 $y = x^2$

2 $y = 6x - 9$

3

11 / 11

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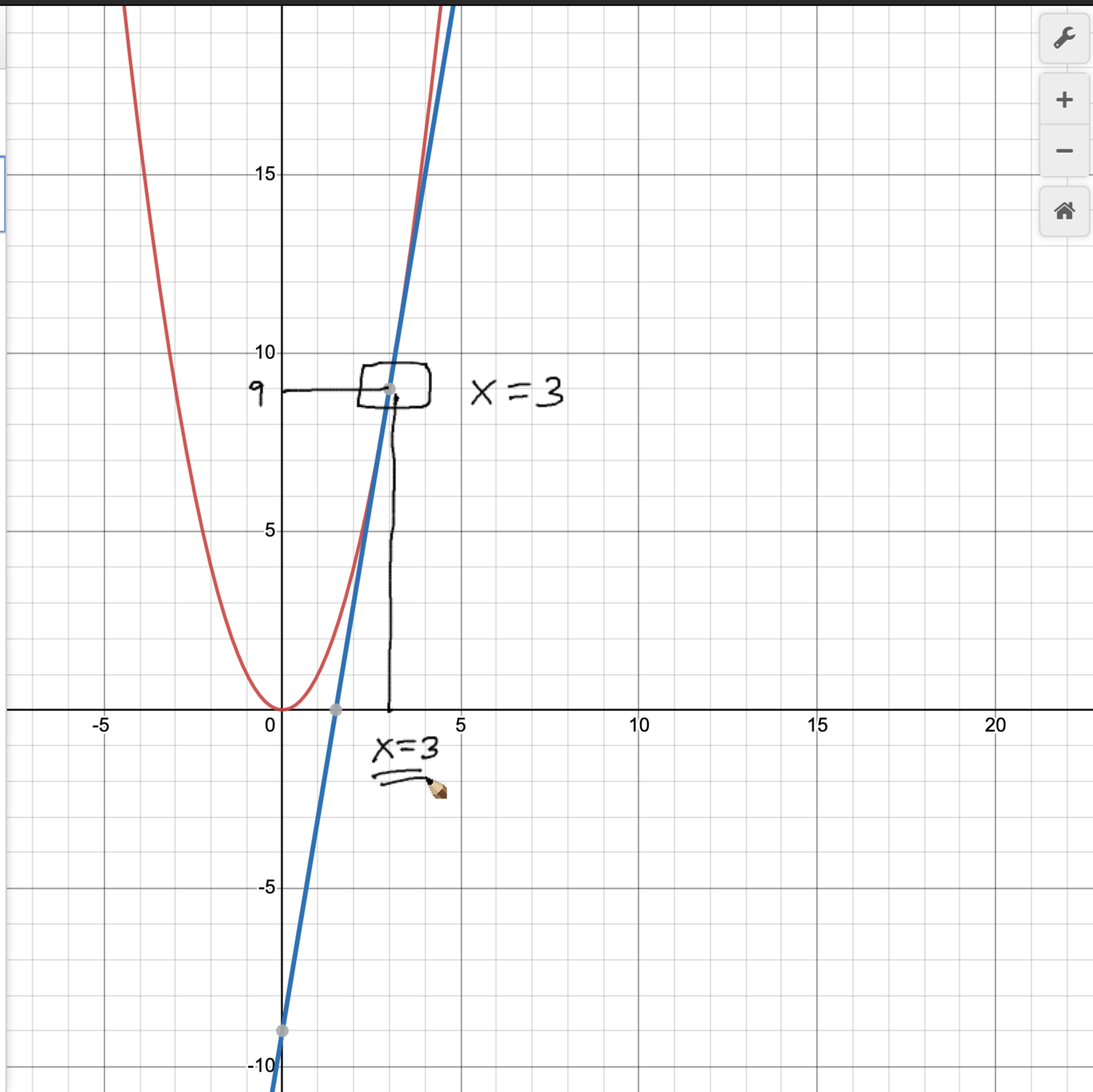

Limits again

In [25]:
```
def f(x):
    return x - 5
```

In [26]:
```
a = 0
left_hand_inputs = [a - i for i in [0.5, 0.1, 0.001, 0.0001]]
right_hand_inputs = [a + i for i in [0.5, 0.1, 0.001, 0.0001]]

print(left_hand_inputs) # as close to 2 as possible from left side
print(right_hand_inputs)
```

```
[-0.5, -0.1, -0.001, -0.0001]
[0.5, 0.1, 0.001, 0.0001]
```

a = 0

In [27]:
```
left_hand_outputs = [f(x) for x in left_hand_inputs]
right_hand_outputs = [f(x) for x in right_hand_inputs]

print("Left Hand outputs: ", left_hand_outputs)
print("Right hand outputs: ", right_hand_outputs)
```

```
Left Hand outputs:  [-5.5, -5.1, -5.001, -5.0001]
Right hand outputs:  [-4.5, -4.9, -4.999, -4.9999]
```

LHL = −5

RHL = −5

In [ ]:


13 / 13