Assignment 4 :

Code:

jupyter gradient descent assgnt (autosaved)

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Not Trusted | Python 3 (ipykernel)

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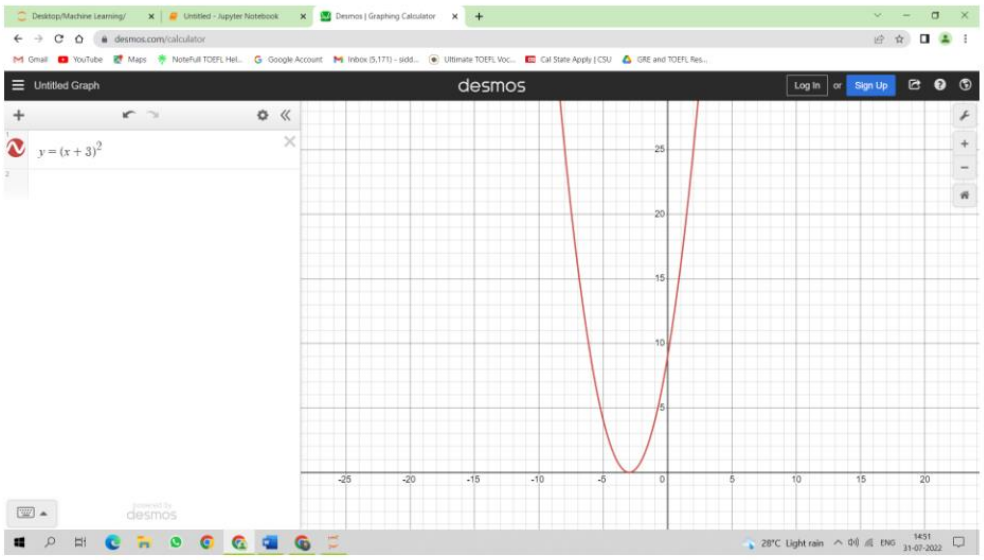
Implement Gradient Descent Algorithm to find the local minima of a function.

For example, find the local minima of the function $y=(x+3)^2$ starting from the point x=2.



We know the answer just by looking at the graph. $y = (x+3)^2$ reaches it's minimum value when x = -3 (i.e when x=-3, y=0). Hence x=-3 is the local and global minima of the function.Below is the implementation in python

In [1]:
```
current_x = 2 # The algorithm starts at x=3
rate = 0.01 # Learning rate
precision = 0.000001 #This tells us when to stop the algorithm
previous_step_size = 1
max_iters = 10000 # maximum number of iterations
iters = 0 #iteration counter
df = lambda x: 2*(x+3) #Gradient of our function
```

In [2]:
```
while previous_step_size > precision and iters < max_iters: #When Previous Step SIze will be less than Precision then we will rec
    previous_x = current_x #Store current x value in prev_x
    current_x = current_x - rate * df(previous_x) #Grad descent
    previous_step_size = abs(current_x - previous_x) #Change in x
    iters = iters+1 #iteration count
    print("Iteration",iters,"\nX value is",current_x) #Print iterations

print("The local minimum occurs at", current_x)
```

```
print("The local minimum occurs at", current_x)
```

```
Iteration 563
X value is -2.999942555213562
Iteration 564
X value is -2.999943704109291
Iteration 565
X value is -2.999944830027105
Iteration 566
X value is -2.999945933426563
Iteration 567
X value is -2.999947014758032
Iteration 568
X value is -2.9999480744628713
Iteration 569
X value is -2.999949112973614
Iteration 570
X value is -2.999950130714142
Iteration 571
X value is -2.999951128099859
The local minimum occurs at -2.999951128099859
```

In [ ]:

In [ ]: