Assignment02_20133096_HyunjaeLee

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In [12]:
```
# 20133096
# Hyunjae Lee

'''
[Assignment 02]
1. Define a differentiable function that maps from real number to real number.
2. Define a domain of the function.
3. Plot the function.
4. Select a point within the domain.
5. Mark the selected point on the function.
6. Define the first-order Taylor approximation at the selected point.
7. Plot the Taylor approximation with the same domain of the original function.
'''

# Import modules
import numpy as np
import matplotlib.pyplot as plt

# 1. Define a differentiable function that maps from real number to real number.
def func(x):
    return 3*x**2 - 2*x + 1
```

In [13]:
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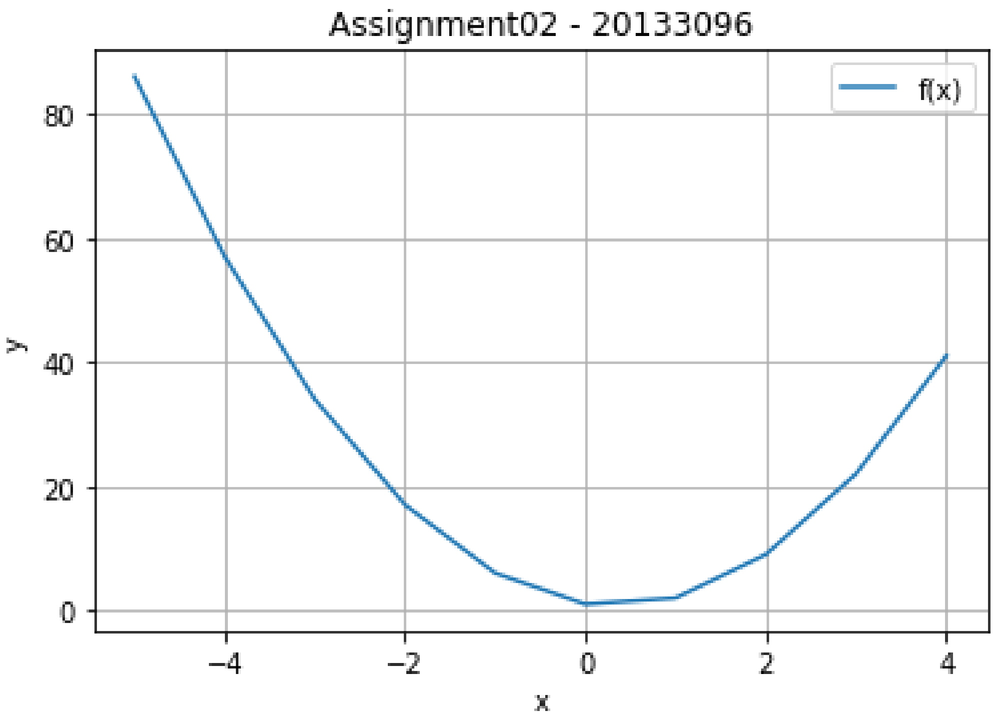
# 2. Define a domain of the function.
D = np.arange(-5,5)
```

In [14]:
```
# 3. Plot the function.
plt.figure(1)
plt.plot(D, func(D), label='f(x)')
plt.xlabel('x')
plt.ylabel('y')
plt.title('Assignment02 - 20133096')
plt.legend()
plt.grid(True)
```

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In [15]: # 4. Select two points within the domain.
         point = [-2,2]
```

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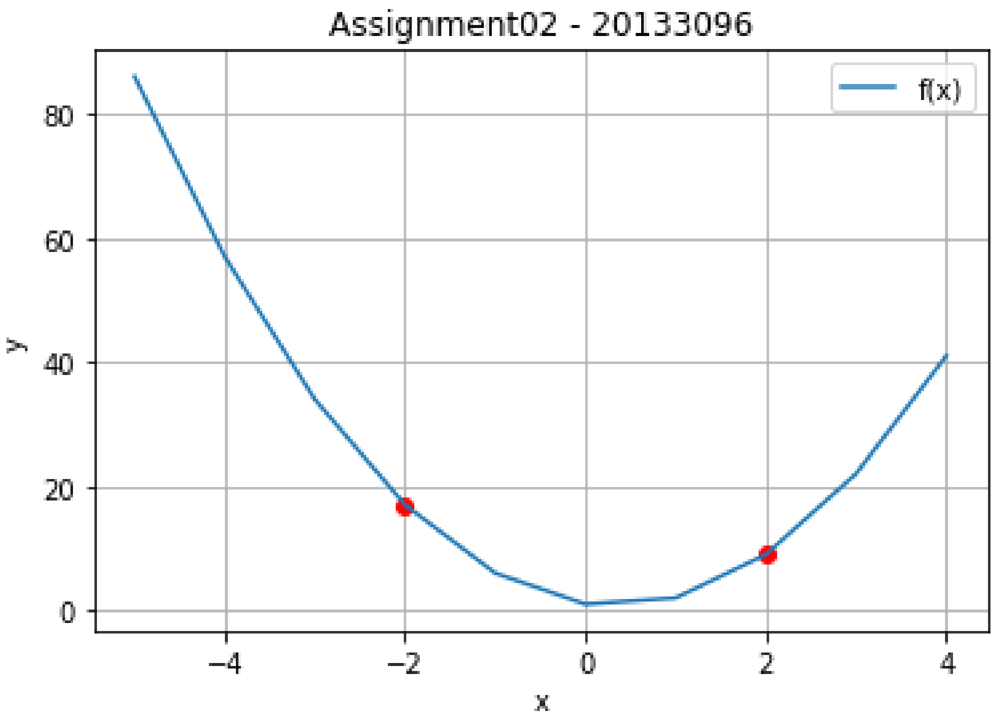
In [16]: # 5. Mark the selected point on the function.
         plt.figure(1)
         plt.plot(point, [func(point[0]),func(point[1])],'ro')
         plt.plot(D, func(D), label='f(x)')
         plt.xlabel('x')
         plt.ylabel('y')
         plt.title('Assignment02 - 20133096')
         plt.legend()
         plt.grid(True)
```

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In [17]: # 6. Define the first-order Taylor approximation at the selected point.
         def deri(x): # y=f'(x)
             return 6*x - 2
         def taylor_func(a,b):
             return func(b) + deri(b)*(a-b)
```

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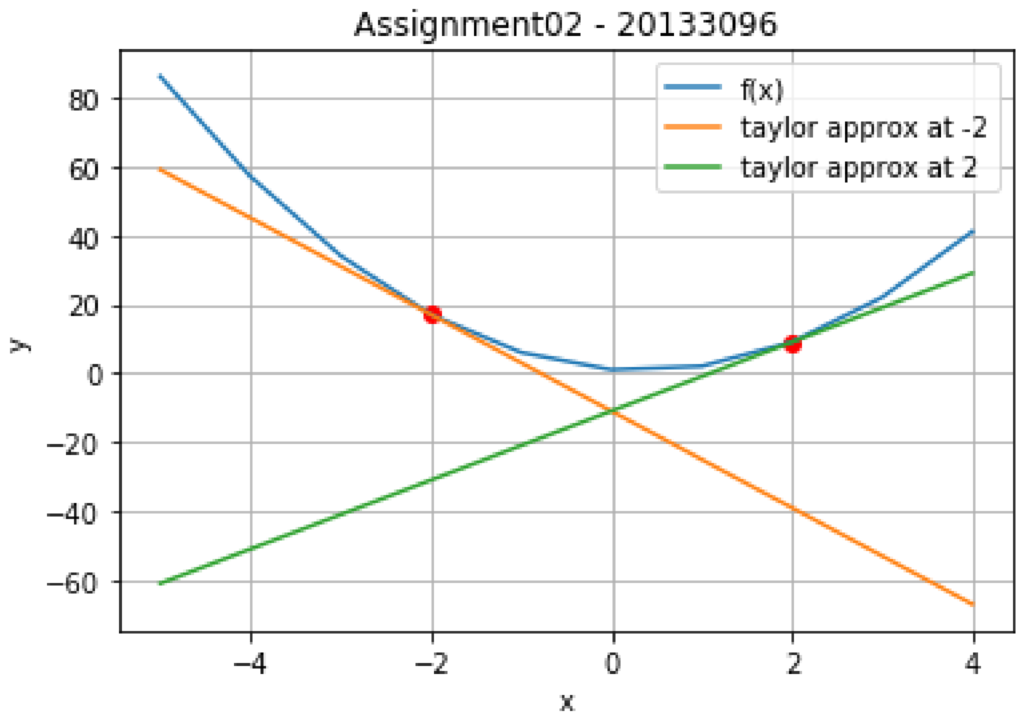
In [18]: # 7. Plot the Taylor approximation with the same domain of the original function.
         plt.figure(2)
         plt.plot(point, [func(point[0]),func(point[1])],'ro')
         plt.plot(D, func(D), label='f(x)')
         plt.plot(D, taylor_func(D, point[0]), label="taylor approx at {0}".format(point[0]))
         plt.plot(D, taylor_func(D, point[1]), label="taylor approx at {0}".format(point[1]))
         plt.xlabel('x')
         plt.ylabel('y')
         plt.title('Assignment02 - 20133096')
         plt.legend()
         plt.grid(True)
```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f(x)
taylor approx at -2
taylor approx at 2
y
x
80
60
40
20
0
−20
−40
−60
−4
−2
0
2
4

```
In [ ]:
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