Andrew Vu - CS156 HW 1

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1   CS156 (Introduction to AI), Spring 2022

2   Homework 1 submission

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Any special notes or anything you would like to communicate to me about this homework submission goes in here.

2.1   References and sources

List all your references and sources here. This includes all sites/discussion boards/blogs/posts/etc. where you grabbed some code examples.

- Gradient Descent example in the files section of the class

2.2   Solution

Load libraries and set random number generator seed

```
[20]: import numpy as np
      from IPython.display import display, Math, Latex
```

```
[21]: np.random.seed(42)
```

Code the solution

```
[22]: display(Math(r' y = 5x^3 - 20x + 2'))
```

$y = 5x^3 - 20x + 2$

```
[23]: def f(x):
          return 5 * pow(x, 3) - (20*x) + 2
```

```
[24]: def f_prime(x):
          return 15 * pow(x, 2) - 20
```

3 Gradient Descent

```
[25]: init_guess = np.random.randint(-2, 10)

      def gradient_descent(x, learning_rate, num_iterations):
          for i in range(num_iterations):
              x = x - learning_rate * f_prime(x)
              #print(x)
          return x

      solution = gradient_descent(init_guess, 0.01, 1000)
      print("The global minimum is at x = " + str(round(solution, 3)))
```

The global minimum is at x = 1.155