

# CS156 (Introduction to AI), Spring 2022

## Homework 1 submission ¶

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## Solution

### Import libraries, setup random seed

```
In [4]: import numpy as np
        from IPython.display import display, Math, Latex
```

```
In [5]: np.random.seed(42)
```

### Quadratic function

```
In [6]: display(Math(r' f(x) = 5x^3 - 20x + 2'))
```

$$f(x) = 5x^3 - 20x + 2$$

```
In [7]: def f(x):
        return (5 * pow(x, 3) - (20 * x) + 2)
```

```
In [8]: #derivative
        def f_prime(x):
            return (15 * pow(x, 2) - 20)
```

### Gradient descent

```
In [9]: init_solution = np.random.randint(-5, 5)

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

solution = gradient_descent(init_solution, .01, 1000)
print("Final solution is "+str(round(solution, 2)))
```

Final solution is 1.15