Pre class Assignment - 24

Q1. $f(x) = x^3 - 3x^2 - x + 3$ for $x \geq 0$.

$f'(x) = 3x^2 - 6x - 1$

for gradient descent part.

Starting at $x = 0$.

1) $x_1 = x_0 - \gamma f'(x_0)$
2) $x_2 = x_1 - \gamma f'(x_1)$
3) $x_3 = x_2 - \gamma f'(x_2)$

Now lets fail the approximation by using $\gamma = 5$

$x_4 = x_3 - 5 f'(x_3)$
$x_5 = x_4 - 5 f'(x_4)$
$x_6 = x_5 - 5 \cdot f'(x_5)$

$x_3 \approx$ value after 3 rounds of GD.

Q2. $f(x) = x^4 - x^3 - x^2 + 1$

at $x = -1$

$\gamma = 1/100$.

1) after several iterations observe the value of x to which it seems to be getting closer.

2) for the graph, we can use online plotting tools of software to visualize the function $f(x)$ on the interval $(-1, 2)$.

3) If there an issue on the first part such as not converging to an unexpected value, it could be due to variety of reasons including poor choice of learning rate