422 Quiz 6 Solutions

① Perform gradient descent on the following function. Start @ $x = 2$ and use $\eta = 0.1$

Run for 3 steps. $f(x) = x^3 - 2x$

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

$x = x - \eta f'(x)$

$x = 2 - 0.1(12 - 2)$

$x = 2 - 1$

$x = 1$

$x = 1 - 0.1(3 \times 1^2 - 2) = 1 - 0.1 = 0.9$

$x = 0.9 - 0.1(3(0.9)^2 - 2) = 0.9 - 0.043$

$= 0.857$

② $3x^2 - 2 = 0$

$3x^2 = 2$

$x^2 = \frac{2}{3}$ $\quad x = \frac{\sqrt{2}}{\sqrt{3}} = 0.81$ close!

Setting derivative equal to 0 gives us our answer. * See 622 #2 for more explanation

622 Quiz 6 Solutions

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

$x = x - nf'(x)$

$x = 2 - 0.1(6(2)^2 - 1) = 2 - 0.1(23) = -0.3$

$x = -0.3 - 0.1(6(-0.3)^2 - 1) = -0.254$

$x = -0.254 - 0.1(6(-0.254)^2 - 1) = -0.1927.$

(2) $6x^2 - 1 = 0$

$6x^2 = 1$

$x^2 = \frac{1}{6}$

$x = \sqrt{\frac{1}{6}}$

positive is the answer.

although $-\sqrt{\frac{1}{6}}$ solves the equation we look at the plot and we're headed toward $+\sqrt{\frac{1}{6}}$.

$-\infty$ is not the answer for the same reason