Show all work. Arithmetic expressions do not need to be simplified in your final answer.

1. **(12 points)** You are enclosing an entire rectangular field with chainlink fence, then placing a lightweight chicken-wire fence down the middle, parallel to the sides of the yard. The chainlink fence costs \$15 per foot to install, while the chickenwire will cost \$2 per foot. You have \$3840 for this project; what dimensions maximize the area you can enclose?

2. **(4 points)** Using a starting point of $x_0 = 2$, show the first *three* steps of Newton's method to approximate a solution to $x^3 - 2x^2 + 4 = 0$; you do not need to arithmetically simplify your result for $x_3$.

3. **(4 points)** Using $x_0 = 4$ as your starting point, use *two* steps of Newton's method to approximate $\sqrt[3]{100}$. You do not need to (and probably do not want to) arithmetically simplify your result for $x_2$.

4. **(2 point bonus)** Explain, using graphs and descriptions of the transformations performed on those graphs, why the linear approximation of $\sqrt[k]{n}$ from a reference point $a$ gives the same result as the first step of Newton's method on an appropriate graph with $x_0 = a$.