1. Find two positive numbers whose product is 121 and whose sum is a minimum.

2. Consider the following problem: A farmer with 790 ft of fencing wants to enclose a rectangular area and then divide it into four pens with fencing parallel to one side of the rectangle. What is the largest possible total area of the four pens?

3. A rectangular storage container with an open top is to have a volume of $15 \text{ m}^3$. The length of its base is twice the width. Material for the base costs $15 per square meter. Material for the sides costs $6 per square meter. Find the cost of materials for the cheapest such container.

Please round the answer to the nearest cent.

4. Find the points on the ellipse $16x^2 + y^2 = 16$ that are farthest away from the point $(1, 0)$.

5. Find the dimensions of the rectangle of largest area that has its base on the $x$-axis and its other two vertices above the $x$-axis and lying on the parabola $y = 23 - x^2$.

6. Find an equation of the line through the point $(3, 5)$ that cuts off the least area from the first quadrant.

7. Suppose the line $y = 4x - 5$ is tangent to the curve $y = f(x)$ when $x = 5$. If Newton's method is used to locate a root of the equation $f(x) = 0$ and the initial approximation is $x_1 = 5$, find the second approximation $x_2$. 
8. Use Newton's method with the specified initial approximation \( x_1 = 1 \) to find \( x_3 \) the third approximation to the root of the equation \( x^3 - x^2 - 4 = 0 \). (Give your answer to four decimal places.)

\[ x_3 \approx \; \_\_\_\_\_ \; \_\_\_\_\_ \]

9. Use Newton's method with initial approximation \( x_1 = -1 \) to find \( x_3 \) the third approximation to the root of the equation \( x^5 + 12 = 0 \).

\[ x_3 \approx \; \_\_\_\_\_ \; \_\_\_\_\_ \]

10. Use Newton's method to approximate the root of the equation \( x^4 + x - 4 = 0 \) in the interval \([1, 2]\), correct to six decimal places.

Use \( x_1 = 1.6 \) as the initial approximation.

\[ x \approx \; \_\_\_\_\_\_\_\_ \; \_\_\_\_\_\_\_\_ \]

11. Use Newton's method to find all roots of the equation correct to six decimal places.

\[ e^x = 5 - 2x \]

\[ x = \; \_\_\_\_\_\_\_\_ \; \_\_\_\_\_\_\_\_ \]

12. (a) Use Newton's method with \( x_1 = 1 \) to find the root of the equation \( x^3 - x = 1 \) correct to six decimal places.

\[ x \approx \; \_\_\_\_\_\_\_\_ \; \_\_\_\_\_\_\_\_ \]

(b) Solve the equation \( x^3 - x = 1 \) using \( x_1 = 0.6 \) as the initial approximation.
Please round the answer to six decimal places.

\[ X \approx \quad \]