9. [9 points] Roger owns a second farm of 500 trees which produces both timber and wild honey. He plans to harvest q trees for timber in the month of May, while using the remaining 500 - q trees for honey production. The cost in dollars for Roger to run his farm in May if he harvests q trees for timber is given by

$$C(q) = 100 + 5q + \frac{q^2}{5}.$$

a. [2 points] During May, each tree cut for timber generates \$85 in revenue, while each tree used for honey production yields \$20. Write an expression for the revenue R(q) that Roger earns in May for harvesting q trees while using the remaining 500 - q trees for honey production.

Answer: R(q) = ______ dollars

b. [2 points] Find the marginal revenue MR(q) and the marginal cost MC(q) of Roger's operation in the month of May.

MR(q) =_____, and MC(q) =_____

c. [3 points] How many trees should Roger allocate to timber production in order to maximize his May profits? Use calculus, and show your work. You do not need to fully justify your answer, but partial credit may be awarded for work shown.

Answer: q =_____ trees

d. [2 points] Suddenly Roger remembers his sustainability pledge to replant exactly as many trees as he cuts down. If the cost of replanting a single harvested tree is b, find the *smallest* value of b for which dedicating the entire farm to honey production is at least as profitable as producing both timber and honey.