Math 120E (QUIZ 3, October 16, 1997)

Instructions: You have 25 minutes for this quiz. Show your work; NO CREDIT for answers only. If you use a calculator function or program to obtain an answer, briefly state what program you used. Note that the quiz is on both sides of the paper.

Rachel buys a small apple orchard in Wenatchee which has 100 trees. Each tree produces $100 worth of apples each year. She consults with agricultural experts and learns that for every tree she removes, the yield from each remaining tree will increase by $4 worth of apples each year.

a. (2 points) Let \( x \) be the number of trees in the orchard. Write down a function, \( v(x) \), which gives the total value of the apples produced in Rachel’s orchard each year as a function of \( x \).

b. (2 points) What is the maximum possible value of the apples harvested from Rachel’s orchard each year?

c. (2 points) Rachel hires her out-of-work cousin to care for the orchard and harvest the apples. She agrees to pay him a base salary of $6000 per year, plus $25 per tree. Write down a function, \( w(x) \), for the wages she pays her cousin as a function of \( x \), the number of trees in the orchard.
d. (2 points) What is the smallest possible number of trees she could have in her orchard and still make a profit?

e. (2 points) How many trees should Rachel plant to realize the most profit?