MAT 161 Names _____

1. *Reveer Kitchen Utensils* wants to design a cooking pot in the shape of a right circular cylinder, open at the top. The bottom is to be made of copper, which costs $\$.15/cm^2$. The side of the pot is to be stainless steel, which costs $\$.10/cm^2$. The volume of the pot is to be $4{,}000cm^3$. Find the dimensions of the pot that will minimize the cost of materials. Ignore all costs except for the copper and stainless steel.

2. The water depth in Moon River x miles downstream from Hard Rock is $D(x) = 20x + 10$ feet; the width of the river is $W(x) = 10(x^2 - 8x + 22)$ feet. To create Moon Lake, a dam is to be built downstream from Hard Rock. For engineering reasons, the dam cannot be more than 130 feet high.

(a) For which values of x is $0 \le D(x) \le 130$?

(b) How far downstream can the dam be built? If the dam were constructed at this point, how wide would it be? How high?

(c) What are the dimensions of the widest dam that could be constructed? the narrowest dam?