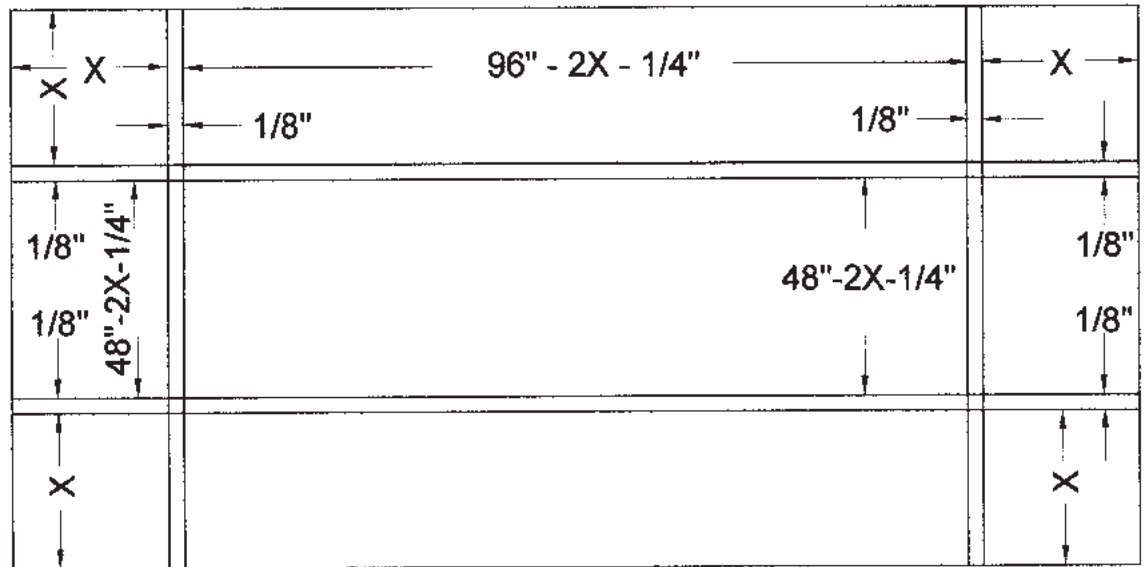




Solution to Problem 107



THE FINAL OUTSIDE DIMENSIONS OF THE LARGEST BOX WILL BE $96'' - 2X - 1/4''$ LONG, $48'' - 2X - 1/4''$ WIDE AND $X + 1/2''$ HIGH. THE INSIDE VOLUME WILL BE: $(96'' - 2X - 1/4'' - 1'')(48'' - 2X - 1/4'' - 1'')(X)$ DUE TO THE THICKNESS OF THE WOOD

THE VOLUME IS THEREFORE

$$(94.75 - 2X)(46.75 - 2X)(X) = 4X^3 - 283X^2 - 4429.5625X$$

THE DERIVATIVE OF THE VOLUME WITH RESPECT TO X IS

$12X^2 - 566X - 4429.5625$, WHICH, IF SET EQUAL TO ZERO, WILL YIELD A MAXIMUM OR MINIMUM VALUE:

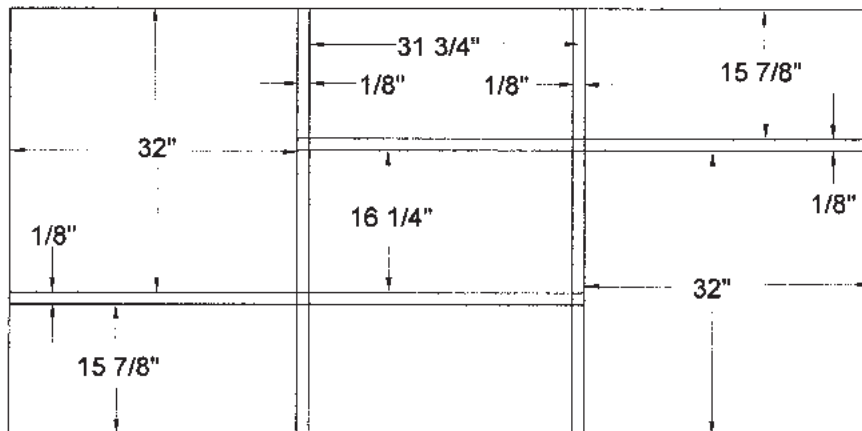
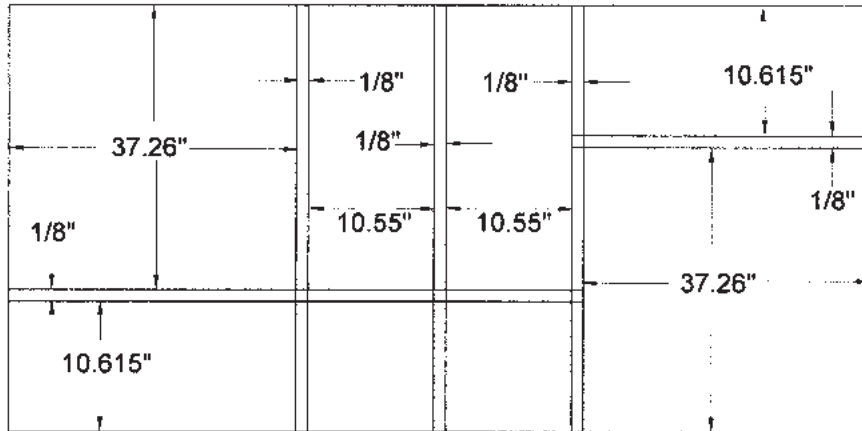
$$12X^2 - 566X - 4429.5625 = 0, \text{ WHICH YIELDS } X = 9.907 \text{ AND } 37.26$$

THE BASE OF THE BOX WILL BE $96'' - (2)(9-29/32'') - 1/4'' = 75 \frac{15}{16}''$ LONG BY $48'' - (2)(9-29/32'') - 1/4'' = 27 \frac{15}{16}''$ WIDE. THE DEPTH WILL BE $9-29/32''$ FOR A VOLUME OF 12.16 CUBIC FEET.





Solution to Problem 108



The alternative solution, $X = 37.26$, will give you a box with a lid! Its outside dimensions will be 37.26 inches square by 11.05 inches high. The inside will be 36.76 inches square by 10.55 inches high for a volume of 8.25 cubic feet, and it uses more of the plywood.

(This is not the maximum volume for a box with a lid. A box 32 inches square by 16 7/8 inches on the outside can be made with an inside depth of 15 7/8 inches and 31 inches square. The inside volume will be 8.83 cubic feet.)