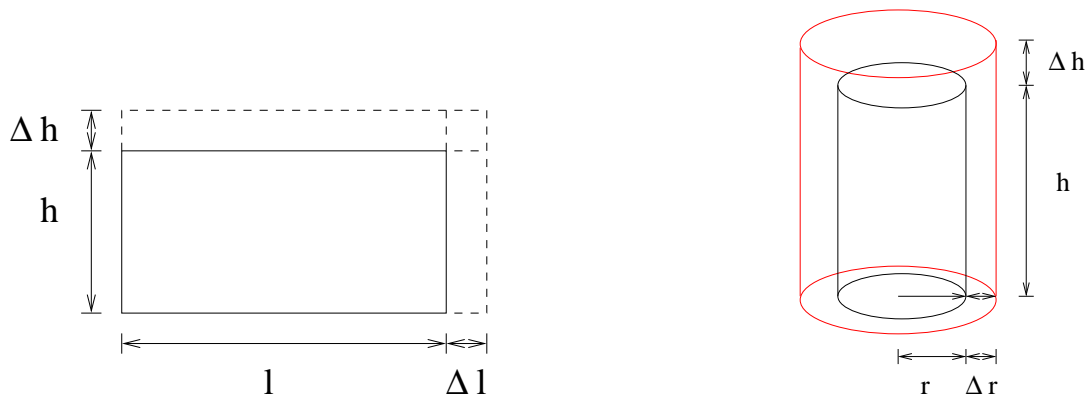


MATH 3511 Miscellaneous Calculus Homework

Problems Bennethum

These are homework problems involving total differentials and multiple integration. The exact assignment (which problems and due-date) will be announced in class.

1. (a) The area of the rectangle in the figure is $A = lh$. Find dA and identify the regions in the figure whose areas are given by the terms of dA . What region represents the difference between ΔA and dA ?
- (b) Suppose you are trying to measure the amount of carpet required for a rectangular-shaped room. Your first (very rough) measurement is that $l = 6$ meters and $h = 3$ meters. Which dimension should be measured more accurately to minimize the overall error in the area measurement, using dA as an estimate on the error? Explain your answer in terms of (i) a figure, and (ii) algebraically.
2. The volume of the right circular cylinder in the figure is $V = \pi r^2 h$. Find dV and identify the solids in the figure whose volumes are given by the terms of dV . What part of the solid represents the difference between ΔV and dV ?



Figures for problems 1 and 2.

3.
$$\int_1^\infty \int_1^\infty \frac{1}{xy} dx dy$$

4.
$$\int_0^\infty \int_0^\infty xy e^{-(x^2+y^2)} dx dy$$

Solutions

1b) The answer is \sqrt{e} , your explanation will be given