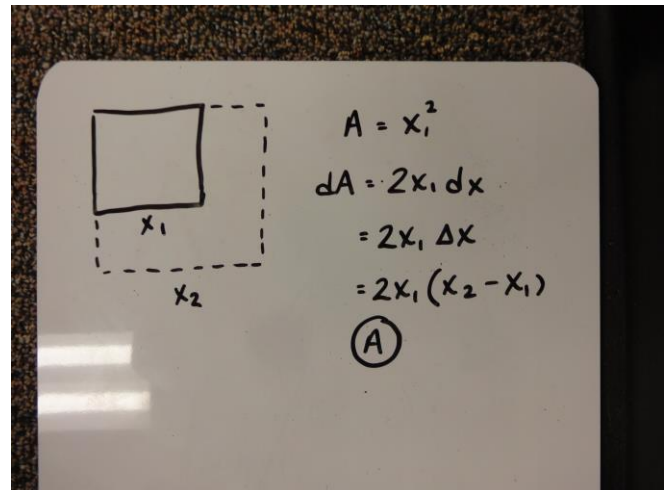
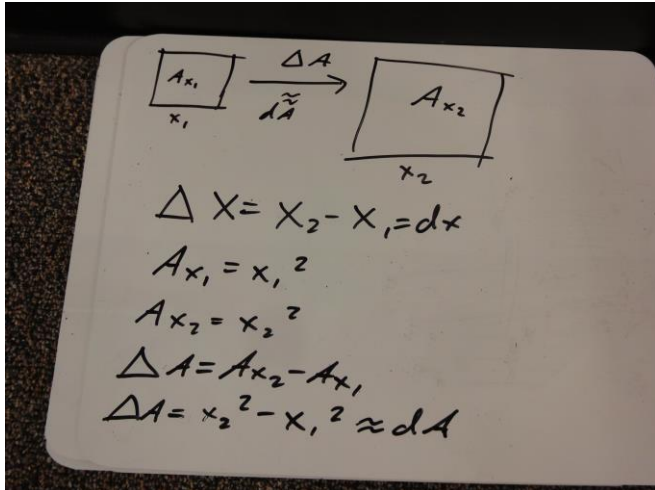
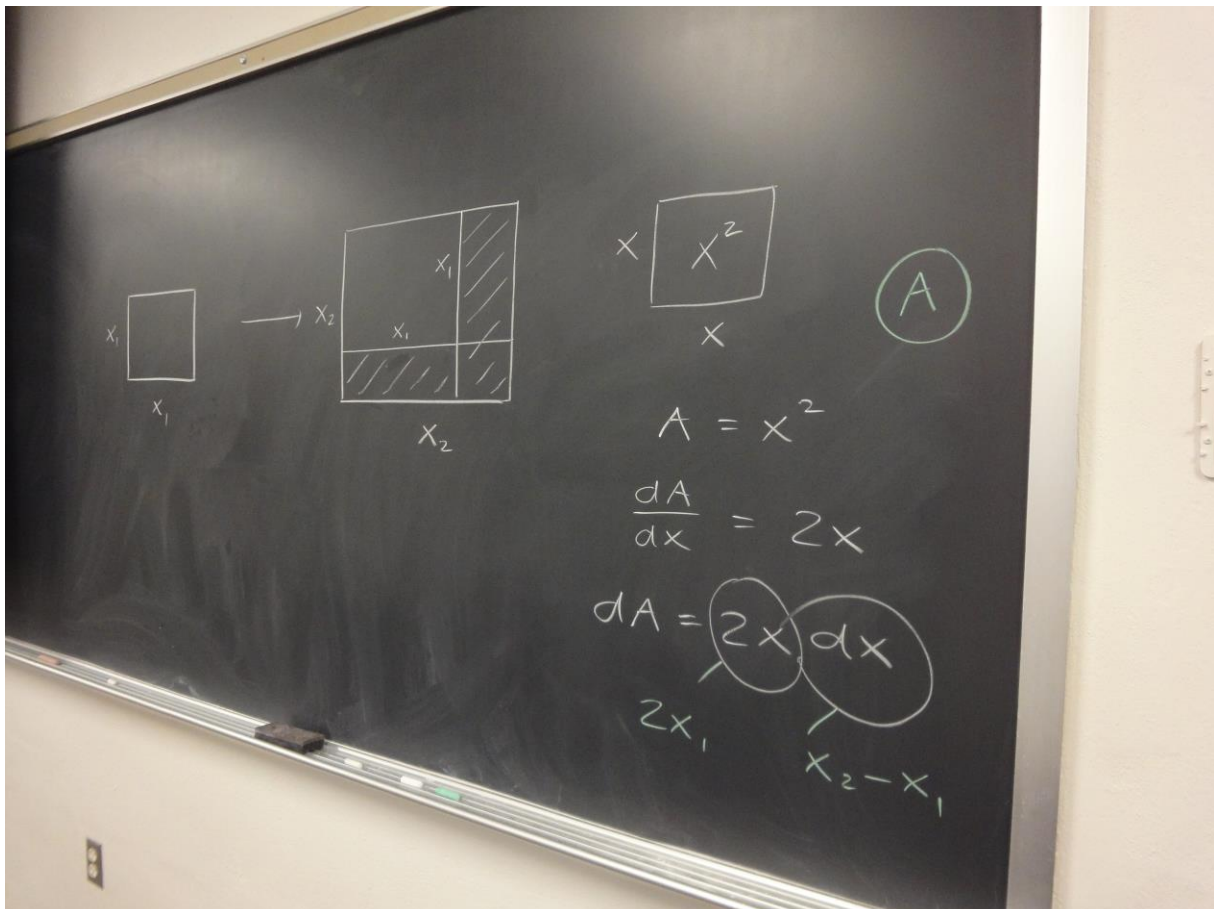


Differentials

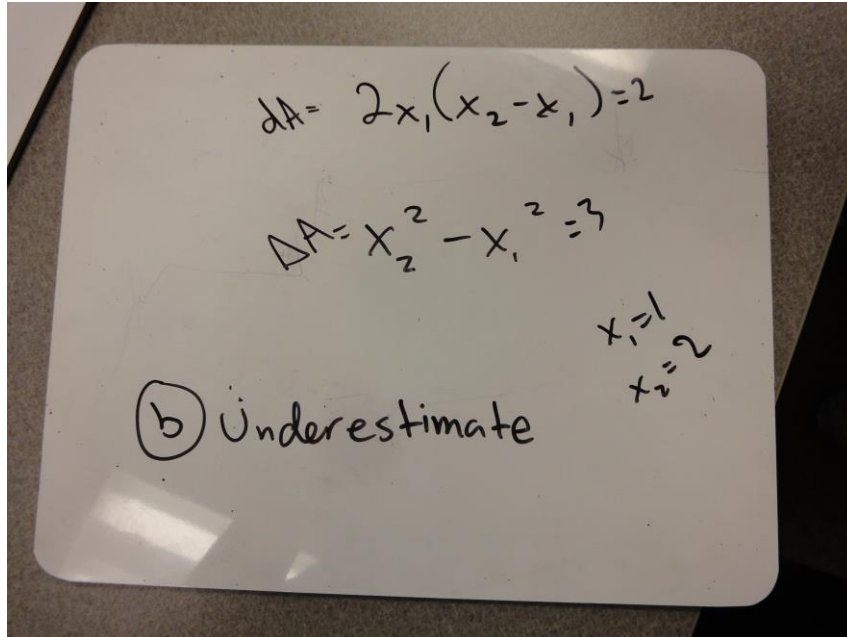
The first problem asks you to find an expression for dA (an estimation for the change in area from a square with side x_1 to a side with x_2). The board below (left) shows an expression for the exact change ΔA :



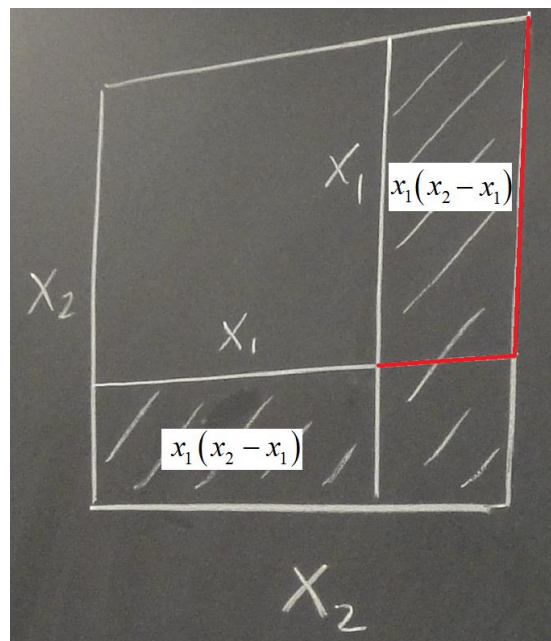
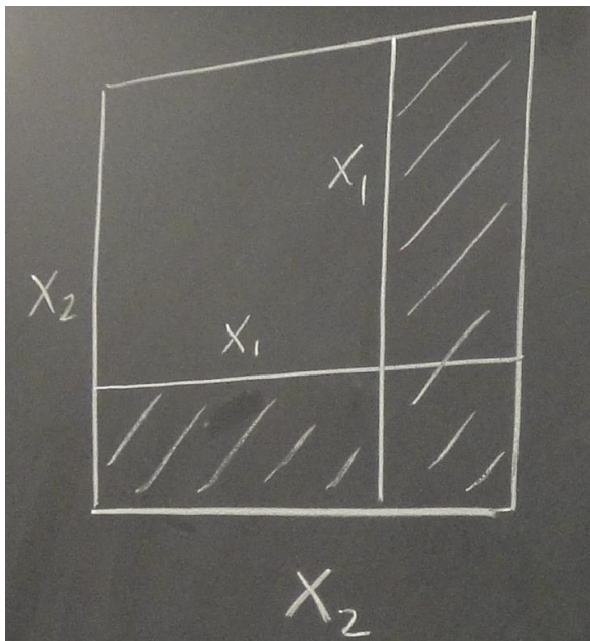
The board (above right) shows the *approximation* for ΔA , what we call dA . Here is the board work for this:



...and this leads nicely into the next problem. Which is bigger, dA or ΔA ? This will give you some idea (just trying some numbers):

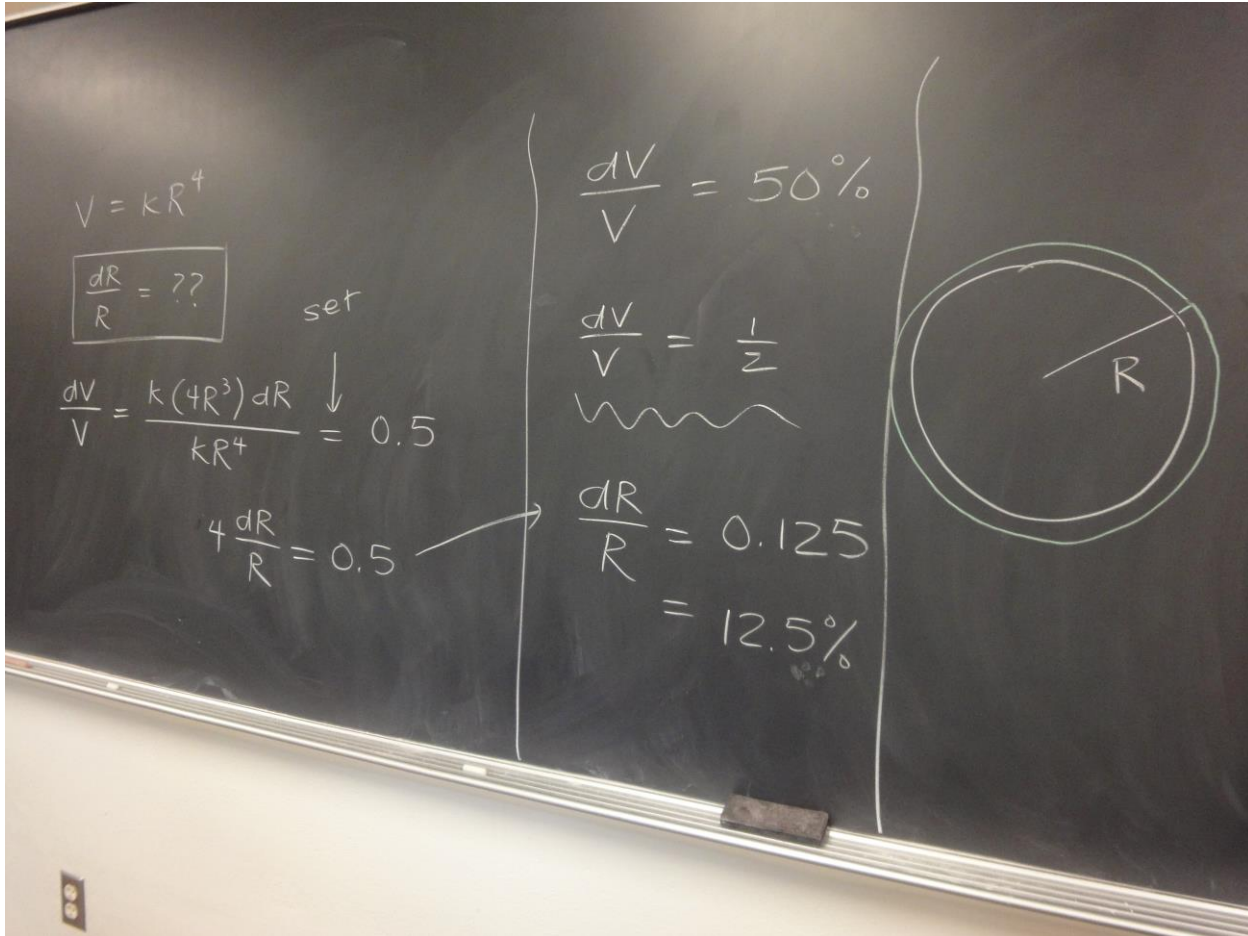


Now ΔA reflects the ACTUAL change in area so it is the shaded portion in the diagram below (left).



But if you think about dA , this can be seen in the same diagram by just making some calculations (see above right). Since dA comprises *some* of the shaded portion that is ΔA , we have $dA < \Delta A$ (so dA underestimates ΔA).

Blood Flow Problem:



A small change in the radius (about a 13% increase) results in a 50% increase in blood flow through the artery.