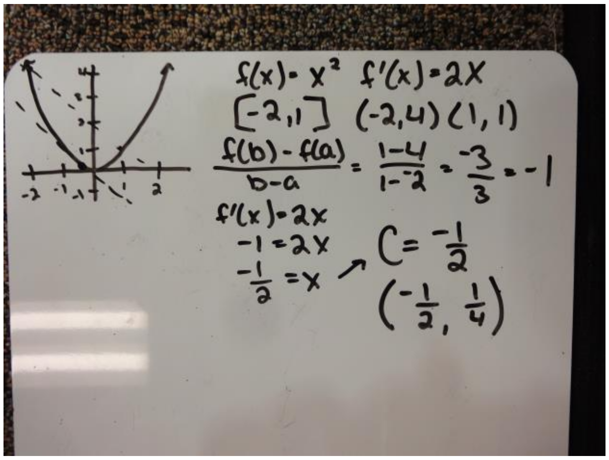
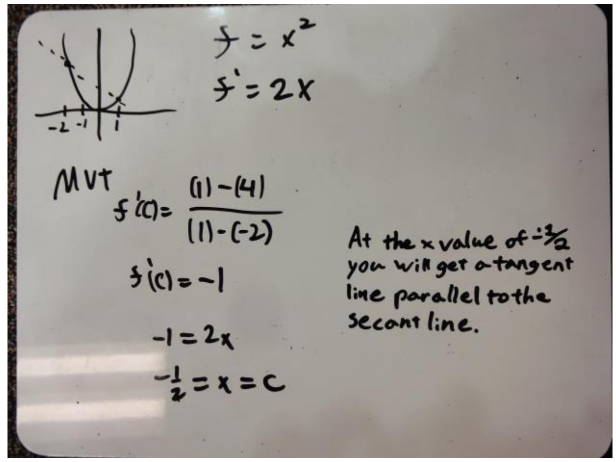
Mean Value Theorem

Graphical problem:

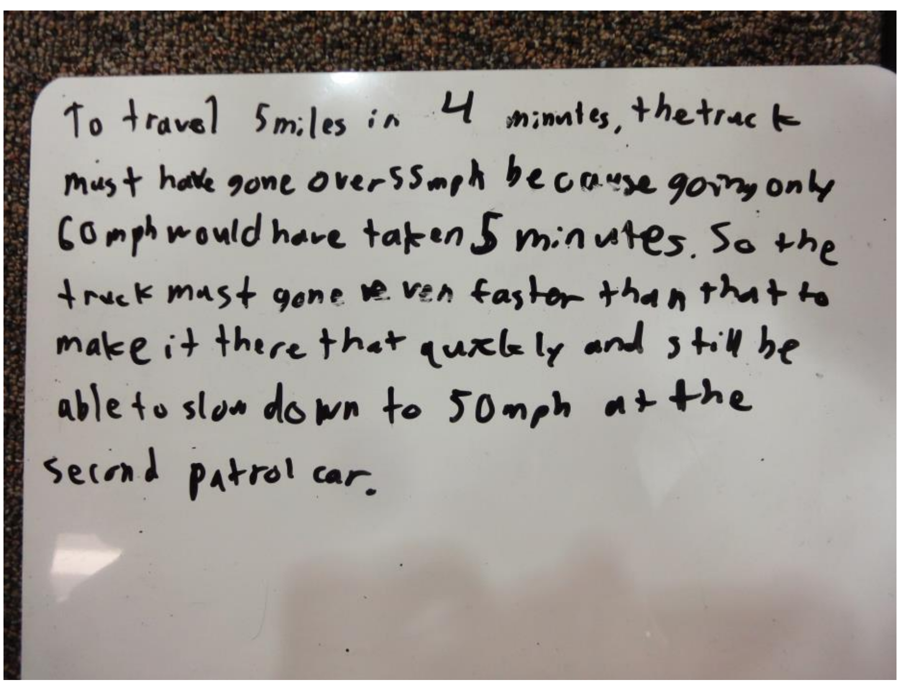




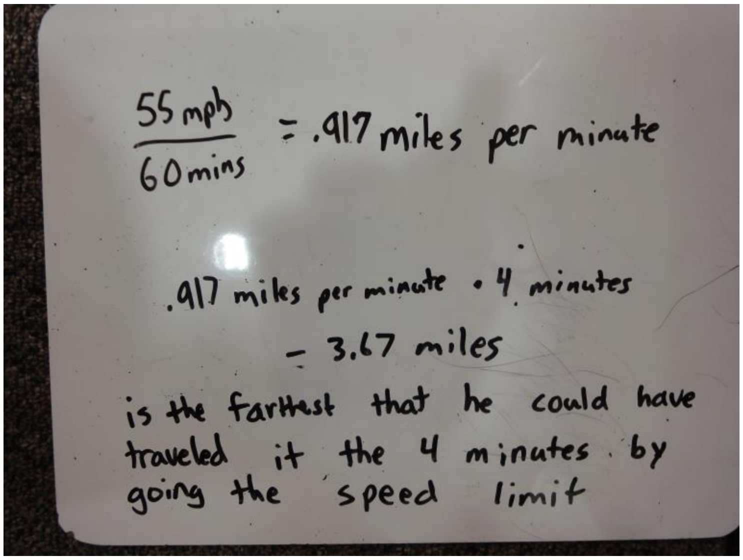
At $c = -\frac{1}{2}$, the slope of the tangent line to $f(x) = x^2$ is the same as the slope of the secant line through the endpoints $(-2,4)$ and $(1,1)$. See the above whiteboards.

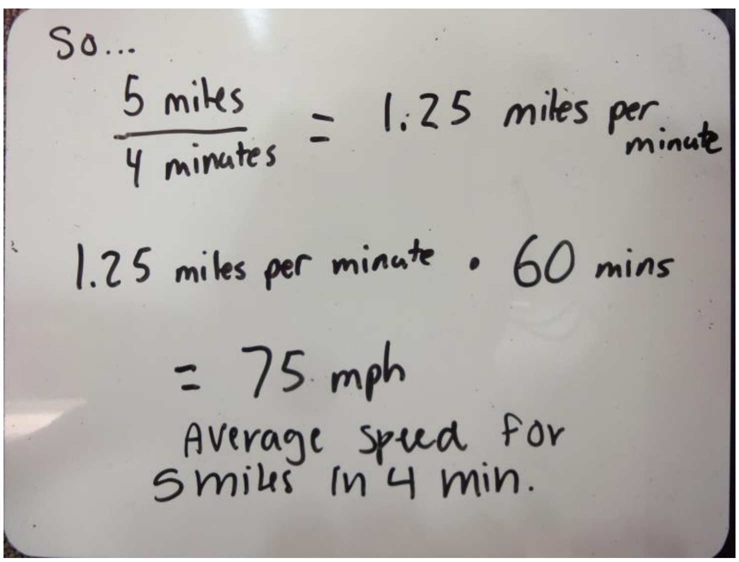
Proving that the truck driver was speeding….

This captures the time factor; the driver was definitely speeding:



But how fast was s/he going?





The driver traveled <u>5 miles in just 4 minutes</u> which amounts to an average speed of 75 miles/hour. This 75 mph corresponds to the slope of the secant line because this is an **average rate of change**. By the MVT, we know there must be a point somewhere between the patrol cars where the truck driver was traveling exactly 75 mph (this corresponds to the tangent line or **instantaneous rate of change**). We do not know *where* it happened but we do know it definitely happened (the value of c is sometimes impossible to locate exactly).