1. Write a function to compute the trace of a (square) matrix.

2. Write a function to compute $|I + tV|$ (a determinant) for any matrix $V$ and any value of $t$.

3. Show that the derivative (wrt $t$) of $|I + tV|$ is $\text{trace}(V)$. Show this by evaluating the function you wrote in (2) at $t$ and $t + \delta$ (for a small value of $\delta$) and divide the difference by $\delta$. This just showing some basic calculus:

$$\frac{df(t)}{dt} = \lim_{\delta \to 0} \frac{f(t + \delta) - f(t)}{\delta}.$$