This problem shows an interesting application of the mean value theorem.

1. Use algebra to verify that $(1+(x-1)^2)(1+(x+1)^2) = 4+x^4$.

2. Differentiate $\arctan(x+1) - \arctan(x-1) + \arctan\left(\frac{x^2}{2}\right)$. Use the result of a) and a **m**ostly **v**ital **t**hing to show that $\arctan(x+1) - \arctan(x-1) + \arctan\left(\frac{x^2}{2}\right)$ is always $\frac{\pi}{2}$.