

MA 158

Quiz 7

12 octobre 2016

Instructions: Show all work, with clear logical steps. No work or hard-to-follow work will lose points.

Recall the important formulae:

$$A = P \left(1 + \frac{r}{n}\right)^{nt} \quad \text{and} \quad A = Pe^{rt}.$$

Problem. (4 points) You have \$20,000 to invest. And you have two different banking options:

A: Compounded monthly at a nominal rate of 11%

B: Compounded continuously at a nominal rate of 10.97%.

Determine whether you would choose A or B. (Justify your response.)

Solution. Since P and t will be the same, to see which option will yield more money, we only need to look at what we are multiplying 20,000 by. For option A, we would be using the formula $A = P \left(1 + \frac{r}{n}\right)^{nt}$ with $n = 12$ and $r = .11$. This gives us

$$\begin{aligned} \left(1 + \frac{r}{n}\right)^{nt} &= \left(1 + \frac{r}{n}\right)^{nt} = \left(1 + \frac{.11}{12}\right)^{12t} \\ &= \left(\left(1 + \frac{.11}{12}\right)^{12}\right)^t \approx 1.1157188^t. \end{aligned}$$

And for compounded continuously, we use $A = Pe^{rt}$ with $r = .1097$. Focusing on the e^{rt} part,

$$e^{.1097t} = (e^{.1097})^t \approx 1.1159432^t.$$

Since $1.1159432 > 1.1157188$, we know that option B would yield more money, so we should choose that one. ☺

There are multiple ways to justify your answer for this problem. You could have also picked a concrete number of years (say 1, for example). As long as you didn't make any rounding errors, you should still be able to conclude that B is the better option.