Name and NetID:

Question 1. A Texas A&M student opens with Wells Fargo a savings account which accrues nominal annual interest at a rate of 5.5% compounded monthly. If \$65.00 is deposited at the end of every month, calculate how long (to the nearest month) it takes for the account to hold \$4500.00. *[4]*

Solution. The nominal rate of 0.055 is annual, and thus there are twelve compounding periods every year (once a month). We have monthly payments of size 65, we want the accumulated value to reach 4500. Applying the formula we obtain the equality:

$$65 \cdot \left(\frac{\left(1+\frac{0.055}{12}\right)^t - 1}{0.055/12} \right) = 4500 \quad \text{so} \quad 1.00458^t = 1.31731$$

and thus $t \approx 60.27$ meaning that $\boxed{t = 60}$ months that takes for the account to reach the desired amount.

Question 2. The European Central Bank gave the United Kingdom \$61000 million as its last loan, at an interest rate of 9.5% per year compounded monthly, and is to be repaid in equal monthly installments over a period of eight years. Calculate how much the monthly payments should be in order for the loan to be amortized as described. *[4]*

Solution. The United Kingdom has to repay \$61000 million at an interest rate of 9.5% per year compounded monthly over eight years. The nominal rate of 0.095 is annual, and there are twelve compounding periods per year. Over eight years, the units of time are 96. We thus have:

$$61000 = \frac{R \cdot (1 - (1 + 0.095/12)^{-8 \cdot 12})}{0.095/12} = 67.0651R$$

and thus they need to make monthly payments of $\boxed{R \approx 909.56}$ million dollars.

Question 3. Determine the accumulated value after four years on a principal of \$2200 given a nominal interest rate of 3% compounded continuously. *[2]*

Solution. The nominal rate of 0.03 is assumed to be annual, and the present value is 2200. Applying the formula for interest compounded continuously over 4 years we obtain that the accumulated value in dollars is:

$$\boxed{2200 \cdot e^{0.03 \cdot 4} \approx 2480.49}.$$