

**Problem Definition**

Problem 70 (modified on Compound Interest) You deposit \$1200 in an account that is compounded monthly at an annual rate of  $r$  in decimal form. The balance at the end of 5 years is given by

$$A = 1200 \left(1 + \frac{r}{12}\right)^{60}$$

Does the limit of  $A$  exist as the interest rate approaches 5%. If so, what is the limit.

**Solution Step 1:**

In terms of the form of the function, if we consider how the value  $A$  varies with respect to  $r$  we see that it looks like a polynomial of degree 60. This can be determined by expanding all of the factors. We know that any polynomial has a limit at all real numbers.

**Solution Step 2:**

Now, let's compute the limit. This gives

$$A = \lim_{r \rightarrow 0.05} 1200 \left(1 + \frac{r}{12}\right)^{60} = 1200 \left(1 + \frac{0.05}{12}\right)^{60} \approx 1504.03$$

where the value is determined using a calculator.