Nathan Pick

Homework 6

1. Problems 8.B:1

1. show that $\sum\limits_{x=0}^{9} (e^t)^x = \dfrac{1-e^{10t}}{1-e^t}$

   For an infinite geometric series, if $r < 1$

   then $\dfrac{1}{1-r} = 1 + r + r^2 + \cdots$

   For a finite geometric series, we have

   $S_n = \dfrac{a_1(1-r^n)}{1-r}$, if $r < 1$.

   In our case, $r = e^x$ and $n = 10$. Note $a_1 = 1$.

   So we get $S_n = \dfrac{1-(e^x)^{10}}{1-(e^x)} = \dfrac{1-e^{10x}}{1-e^x}$.