A compound interest account starts with $4000. 6 years later it is $6000.
Show work; only 3 points per part without work. Remember the units (-1 point if omitted).

\[ N_0 = 4000 \]
\[ N(6) = 6000 \]
\[ N(t) = N_0 e^{kt} \]
\[ N(t) = 4000 e^{kt} \]
\[ 4000 e^{6k} = N(6) = 6000 \]
\[ e^{6k} = 6000/4000 = 3/2 \]
\[ 6k = \ln(3/2) \]
\[ k = \frac{1}{6} \ln \left( \frac{3}{2} \right) \]
\[ N(t) = 4000 e^{\left( \frac{1}{6} \ln \frac{3}{2} \right) t} \]

(a)(6) Determine the growth constant \( k \).
\[ k = \frac{1}{6} \ln \left( \frac{3}{2} \right) \]

(b)(3) How much will there be in the account after 12 years?
\[ N(12) = 4000 e^{\left( \frac{1}{6} \ln \frac{3}{2} \right) 12} \]
\[ = 4000 e^{2 \ln \frac{3}{2}} \text{ dollars (stop here, don't need to continue to } = 4000 e^{\ln \frac{3}{4}} = 4000 \left( \frac{9}{4} \right) = 9000) \]

(c)(6) When will the account have $8000?
Let \( t \) = time when amount is $8000
\[ N(t) = 8000 \]
\[ 4000 e^{\left( \frac{1}{6} \ln \frac{3}{2} \right) t} = 8000 \]
\[ e^{\left( \frac{1}{6} \ln \frac{3}{2} \right) t} = 2 \]
\[ \left( \frac{1}{6} \ln \frac{3}{2} \right) t = \ln 2 \]
\[ t = \ln 2 / \left( \frac{1}{6} \ln \frac{3}{2} \right) = 6 \ln 2 / \ln \frac{3}{2} \text{ years} \]