Exercise 1 Section 6.9 in G & S

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In[2]:= **Solve[Det[{{-mu, mu}, {lambda, -lambda}} - x {{1, 0}, {0, 1}}] == 0, {x}]**

Out[2]= $\{\{x \to 0\}, \{x \to -lambda - mu\}\}$

In[4]:= **Solve[{{-mu, mu}, {lambda, -lambda}}.{{b11, b12}, {b21, b22}} ==**
       {{b11, b12}, {b21, b22}}.{{0, 0}, {0, -lambda - mu}}, {b11, b12, b21, b22}]

Out[4]= $\left\{\left\{b21 \to b11, \ b22 \to -\dfrac{b12 \ lambda}{mu}\right\}\right\}$

In[5]:= **B = {{1, mu}, {1, -lambda}};**

In[11]:= **FullSimplify[B.{{1, 0}, {0, Exp[-t * (lambda + mu)]}}.Inverse[B]]**

Out[11]= $\left\{\left\{\dfrac{lambda + e^{-(lambda + mu) t} \ mu}{lambda + mu}, \ \dfrac{mu - e^{-(lambda + mu) t} \ mu}{lambda + mu}\right\},\right.$

$\left.\left\{\dfrac{lambda - e^{-(lambda + mu) t} \ lambda}{lambda + mu}, \ \dfrac{e^{-(lambda + mu) t} \ lambda + mu}{lambda + mu}\right\}\right\}$