

In[14]:= **X = {1, x, y}**

A = {X /. {x → 0, y → 0}, X /. {x → a, y → 0}, X /. {x → 0, y → b}}

Out[14]= {1, x, y}

Out[15]= {{1, 0, 0}, {1, a, 0}, {1, 0, b}}

In[16]:= **NN = X.Inverse[A]**

Out[16]= $\left\{1 - \frac{x}{a} - \frac{y}{b}, \frac{x}{a}, \frac{y}{b}\right\}$

In[17]:= **B = {D[NN, x], D[NN, y], NN}**

Out[17]= $\left\{\left\{-\frac{1}{a}, \frac{1}{a}, 0\right\}, \left\{-\frac{1}{b}, 0, \frac{1}{b}\right\}, \left\{1 - \frac{x}{a} - \frac{y}{b}, \frac{x}{a}, \frac{y}{b}\right\}\right\}$

In[18]:= **c = {{a11, 0, 0}, {0, a22, 0}, {0, 0, 0}}**

Out[18]= {{a11, 0, 0}, {0, a22, 0}, {0, 0, 0}}

In[20]:= **ke = $\int_0^a \left(\int_0^{b-b/a x} (\mathbf{B}^T \cdot \mathbf{c} \cdot \mathbf{B}) \, dy \right) dx$ // MatrixForm**

Out[20]//MatrixForm=

$$\begin{pmatrix} \frac{a a_{22}}{2 b} + \frac{a_{11} b}{2 a} & -\frac{a_{11} b}{2 a} & -\frac{a a_{22}}{2 b} \\ -\frac{a_{11} b}{2 a} & \frac{a_{11} b}{2 a} & 0 \\ -\frac{a a_{22}}{2 b} & 0 & \frac{a a_{22}}{2 b} \end{pmatrix}$$