In[]:=
```
pol = w0 w2 (a α - α x + (b - a) y)^2 - 4 a w1^2 y (α x - b y)
```

Out[]=
$$w0\ w2\ ((-a+b)\ y + a\ \alpha - x\ \alpha)^2 - 4\ a\ w1^2\ y\ (-b\ y + x\ \alpha)$$

In[]:=
```
a[1, 1] = Coefficient[Expand[pol], x^2]
```

Out[]=
$$w0\ w2\ \alpha^2$$

In[]:=
```
a[2, 2] = FullSimplify[Coefficient[Expand[pol], y^2]]
```

Out[]=
$$4\ a\ b\ w1^2 + (a-b)^2\ w0\ w2$$

In[]:=
```
a[1, 2] = FullSimplify[Coefficient[Expand[pol], x y]] / 2
```

Out[]=
$$-\left(2\ a\ w1^2 - a\ w0\ w2 + b\ w0\ w2\right)\ \alpha$$

In[]:=
```
a[2, 1] = a[1, 2];
```

In[]:=
```
a[1, 3] = FullSimplify[Coefficient[Coefficient[Expand[pol], x ], y, 0]] / 2
```

Out[]=
$$-a\ w0\ w2\ \alpha^2$$

In[]:=
```
a[3, 1] = a[1, 3];
```

In[]:=
```
a[2, 3] = FullSimplify[Coefficient[Coefficient[Expand[pol], y ], x, 0]] / 2
```

Out[]=
$$a\ (-a+b)\ w0\ w2\ \alpha$$

In[]:=
```
a[3, 2] = a[2, 3];
```

In[]:=
```
CoefficientList[Expand[pol], x]
```

Out[]=
$$\left\{4\ a\ b\ w1^2\ y^2 + a^2\ w0\ w2\ y^2 - 2\ a\ b\ w0\ w2\ y^2 + b^2\ w0\ w2\ y^2 - 2\ a^2\ w0\ w2\ y\ \alpha + 2\ a\ b\ w0\ w2\ y\ \alpha + a^2\ w0\ w2\ \alpha^2,\right.$$
$$\left. -4\ a\ w1^2\ y\ \alpha + 2\ a\ w0\ w2\ y\ \alpha - 2\ b\ w0\ w2\ y\ \alpha - 2\ a\ w0\ w2\ \alpha^2,\ w0\ w2\ \alpha^2\right\}$$

In[]:=
```
a[3, 3] = Expand[pol] /. {x → 0, y → 0}
```

Out[]=
$$a^2\ w0\ w2\ \alpha^2$$

In[]:=
```
Expand[pol]
```

Out[]=
$$4\ a\ b\ w1^2\ y^2 + a^2\ w0\ w2\ y^2 - 2\ a\ b\ w0\ w2\ y^2 + b^2\ w0\ w2\ y^2 - 2\ a^2\ w0\ w2\ y\ \alpha + 2\ a\ b\ w0\ w2\ y\ \alpha -$$
$$4\ a\ w1^2\ x\ y\ \alpha + 2\ a\ w0\ w2\ x\ y\ \alpha - 2\ b\ w0\ w2\ x\ y\ \alpha + a^2\ w0\ w2\ \alpha^2 - 2\ a\ w0\ w2\ x\ \alpha^2 + w0\ w2\ x^2\ \alpha^2$$

```
A = {{a[1, 1], a[1, 2]}, {a[2, 1], a[2, 2]}};
```

In[]:=
```
MatrixForm[A]
```

Out[]//MatrixForm=
$$\begin{pmatrix} w0\ w2\ \alpha^2 & -\left(2\ a\ w1^2 - a\ w0\ w2 + b\ w0\ w2\right)\ \alpha \\ -\left(2\ a\ w1^2 - a\ w0\ w2 + b\ w0\ w2\right)\ \alpha & 4\ a\ b\ w1^2 + (a-b)^2\ w0\ w2 \end{pmatrix}$$

In[]:=
```
DD = IdentityMatrix[3];
```

In[]:=
```
For[i = 1, i ≤ 3, i++,
 For[j = 1, j ≤ 3, j++,
  DD[[i, j]] = a[i, j]]]
```

In[ ]:= **DD // MatrixForm**

Out[ ]//MatrixForm=

$$\begin{pmatrix} w0\, w2\, \alpha^2 & -\left(2\, a\, w1^2 - a\, w0\, w2 + b\, w0\, w2\right)\, \alpha & -a\, w0\, w2\, \alpha^2 \\ -\left(2\, a\, w1^2 - a\, w0\, w2 + b\, w0\, w2\right)\, \alpha & 4\, a\, b\, w1^2 + (a - b)^2\, w0\, w2 & a\, (-a + b)\, w0\, w2\, \alpha \\ -a\, w0\, w2\, \alpha^2 & a\, (-a + b)\, w0\, w2\, \alpha & a^2\, w0\, w2\, \alpha^2 \end{pmatrix}$$

In[ ]:= **Det[A] // Simplify**

Out[ ]= $-4\, a^2\, w1^2\, \left(w1^2 - w0\, w2\right)\, \alpha^2$

In[ ]:= **Det[DD] // Simplify**

Out[ ]= $-4\, a^4\, w0\, w1^4\, w2\, \alpha^4$