```
A:=[0,1,2]; B:=[0,1,2];
T:=array([[1,2],[1.5,1]]);
g:=(x,y)->f(A,B,T,x,y);
```
→ parvika punter

defines a function g which coincides with the step function in the last example above.

Example 4.7 (Conic Sections) As another example of branching, we will look at the classification of conic sections given by the equation

$$Ax^2 + By^2 + Cx + Dy + E = 0. \tag{4.1}$$

Since there is no xy term, the conic sections will have horizontal and/or vertical axes of symmetry. We will organize our procedure around the coefficients of the square terms A and B. We have the following cases:

1. ($A \neq 0$ and $B \neq 0$) Completing the square on both of the squared terms in equation (4.1) yields

$$A\left(x + \frac{C}{2A}\right)^2 + B\left(y + \frac{D}{2B}\right)^2 = M,$$

where $M = \frac{BC^2 + AD^2 - 4EAB}{4AB}$. → ABCDE

(i) If $M = 0$ and if

(a) A and B have the same sign, then the graph is just a point $(-C/2A, -D/2B)$.

(b) A and B have opposite signs, then the graph is two lines $x + \frac{C}{2A} = \pm\sqrt{|\frac{B}{A}|}(y + \frac{D}{2B})$.

(ii) If $M \neq 0$, then the equation can be rewritten as

$$\frac{(x + C/2A)^2}{M/A} + \frac{(y + D/2B)^2}{M/B} = 1.$$

(a) If M/A and M/B are both positive, the graph is an ellipse.

(b) If M/A and M/B have opposite signs, the graph is a hyperbola.

(c) If M/A and M/B are both negative, there is no graph.

2. ($A = 0$ and $B \neq 0$) Equation (4.1) in this case is equivalent to

$$B\left(y + \frac{D}{2B}\right)^2 = -Cx - E + \frac{D^2}{4B}.$$