A2Q6

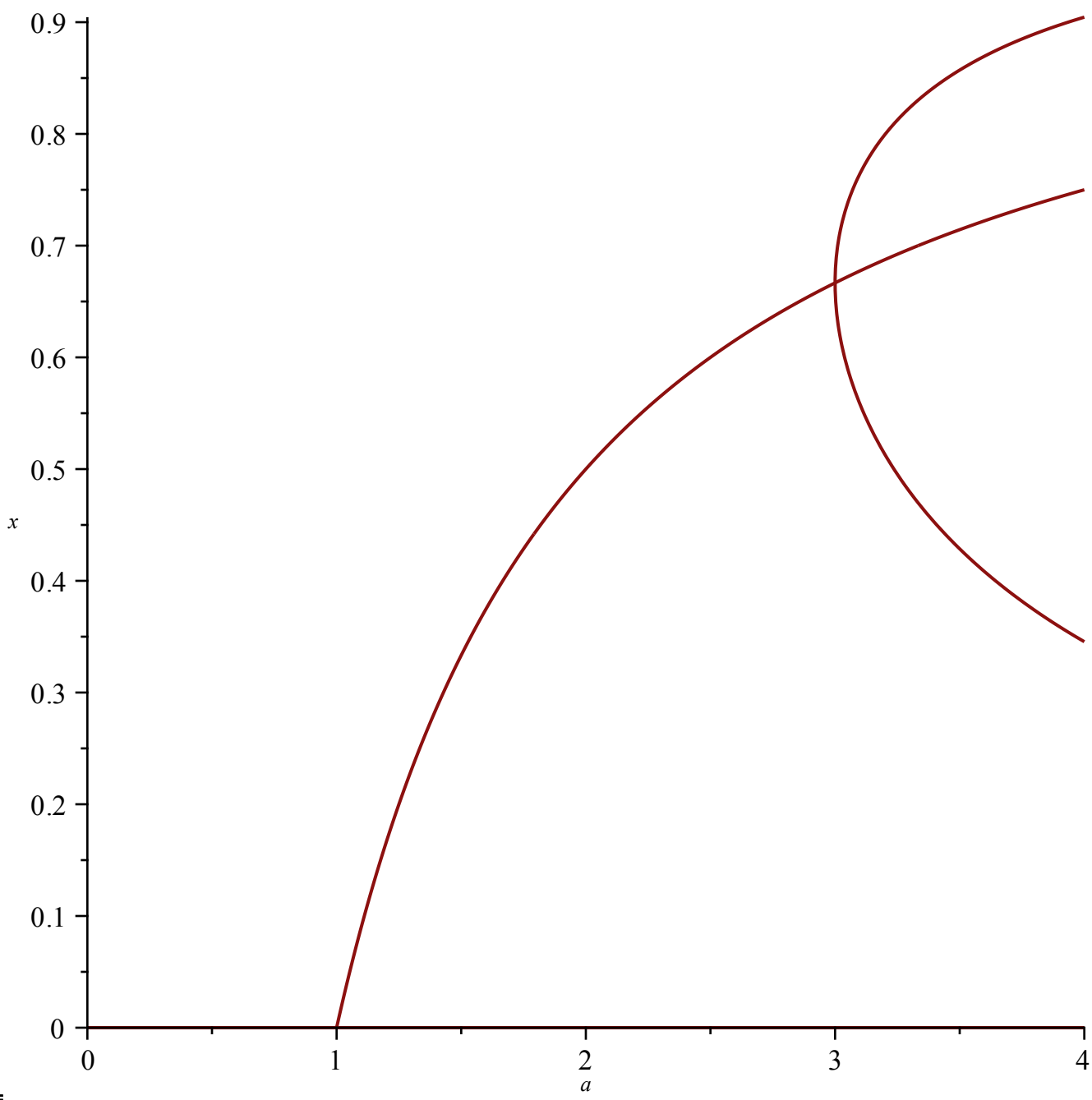
Consider the function $g(a,x) = a^2 \cdot x \cdot (1-x) \cdot (1 - a \cdot x + a \cdot x^2)$. We want to study the solutions of $g(a,x) = x$ for $0 \le a \le 4$ and $0 \le x \le 1$.

One way is to create an implicit plot of $g(a,x) = x$. Do this using the **implicitplot** command in the plots package.

```
> restart:
> g := a^2*x*(1-x)*(1-a*x+a*x^2)
```

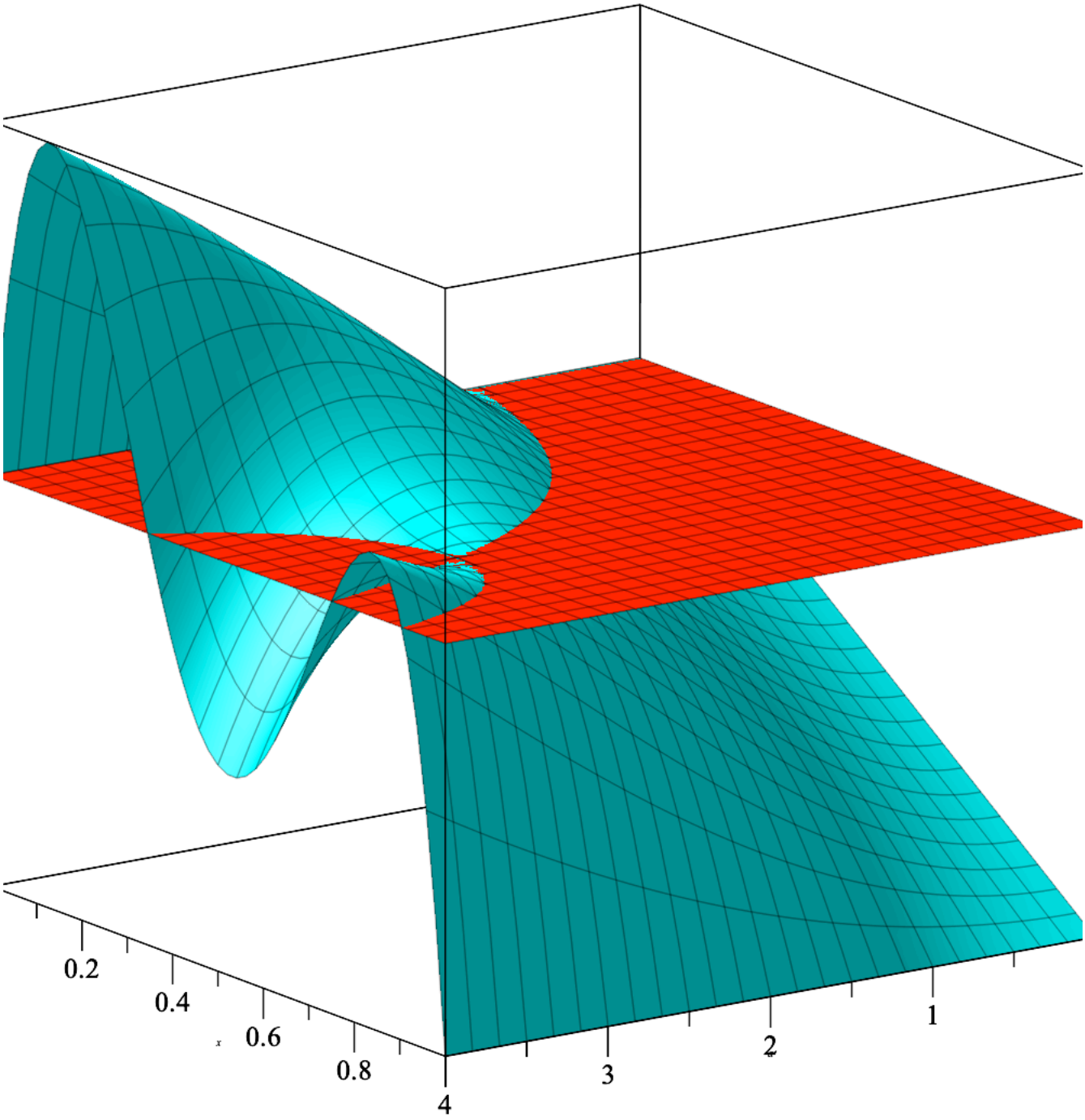
$$g := a^2 x (1-x) (a x^2 - a x + 1) \quad \textbf{(1)}$$

```
> with(plots):
> implicitplot(g-x, a=0..4, x=0..1);
```



Another way is to graph the function $g(a,x) - x$ in 3 dimensions for $0 \le a \le 4$ and $0 \le x \le 1$ and see where the z coordinate is 0. To do this visually we can graph the 0 function. Do this using the **plot3d** command (graph $g(a,x) - x$ and 0 on the same plot). Rotate the plot so that it matches the implicit plot.

```
> gplot := plot3d(g-x,a=0..4,x=0..1,color=cyan):
> zeroplot := plot3d(0,a=0..4,x=0..1,color=red):
> display(gplot,zeroplot);
```


0.2
0.4
x
0.6
0.8
4
3
2
1