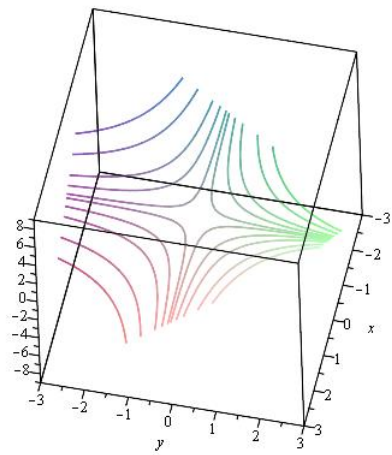
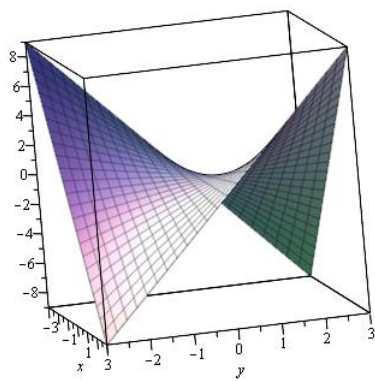
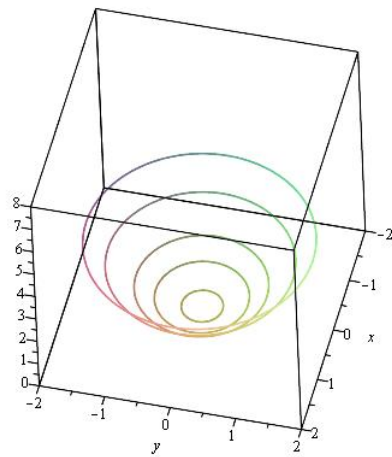
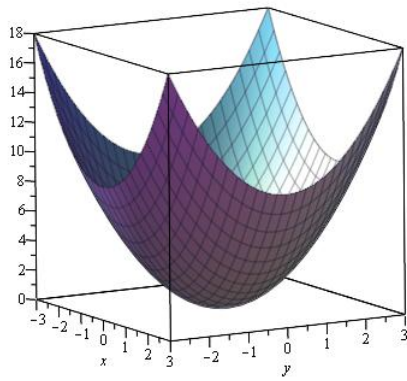
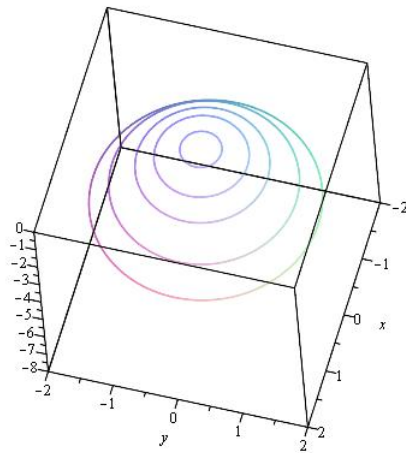
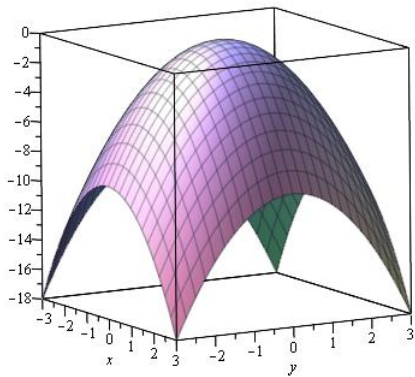
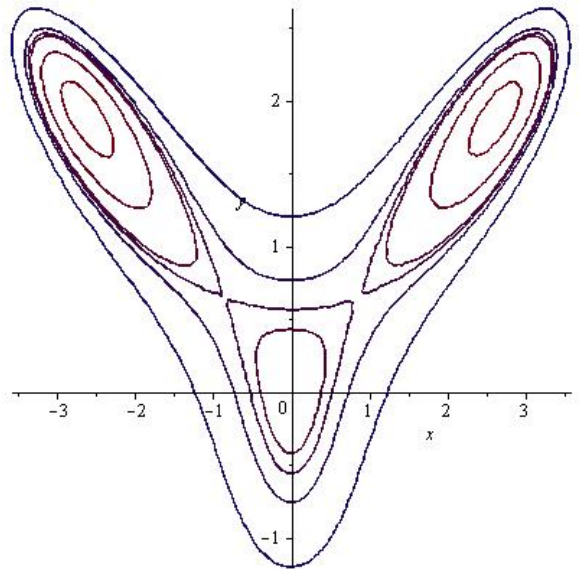
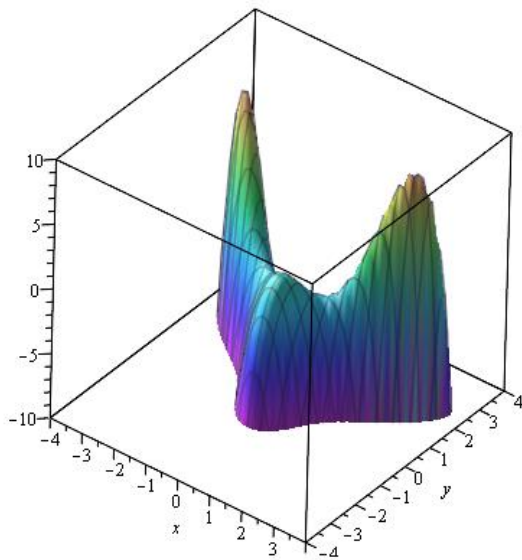
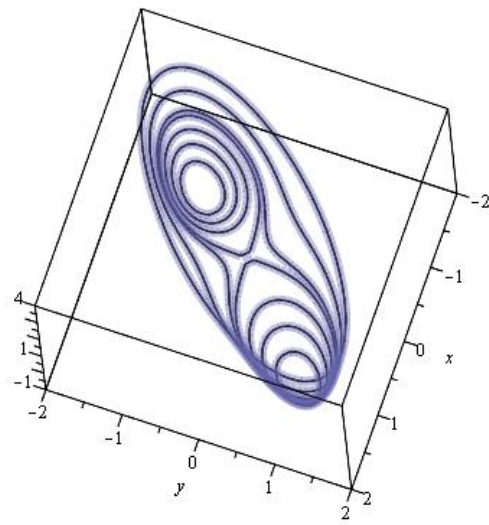
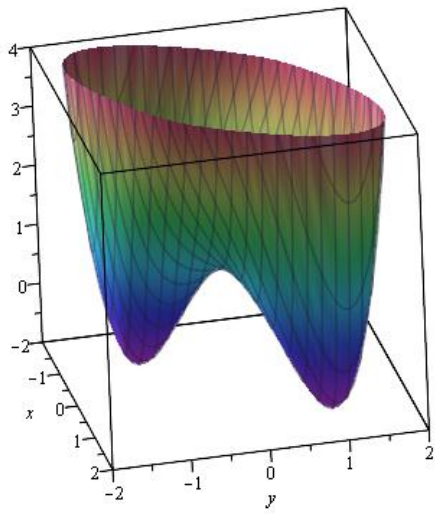


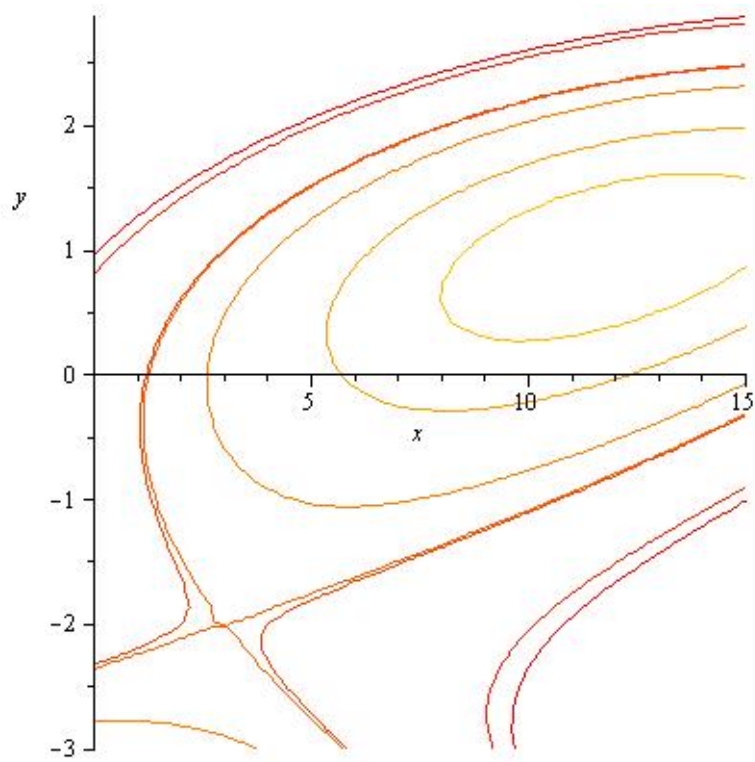
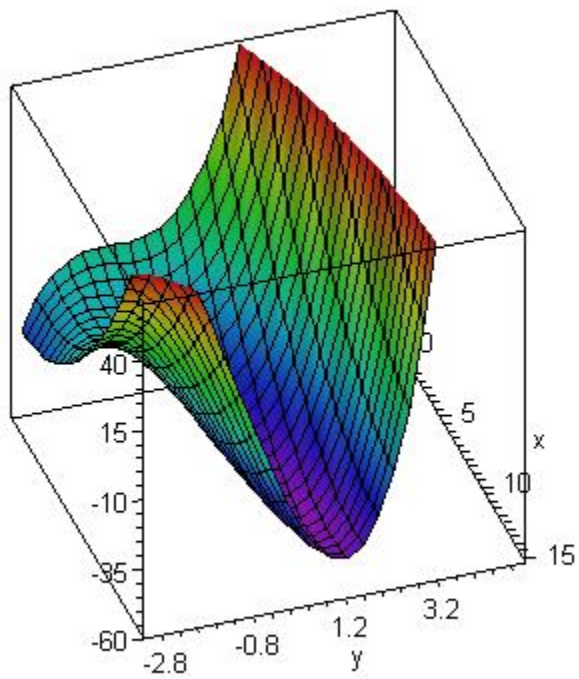
## Typical Max, Min, Saddle



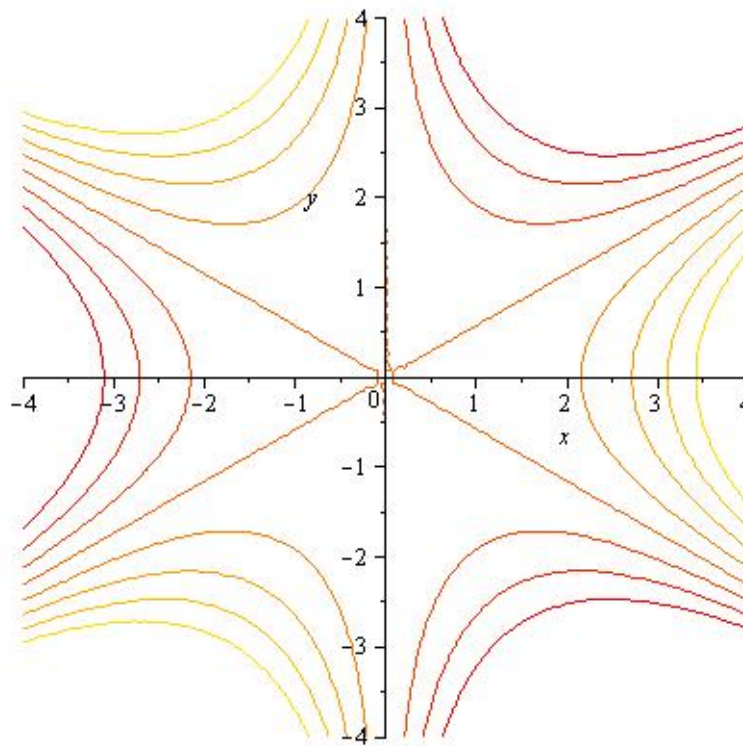
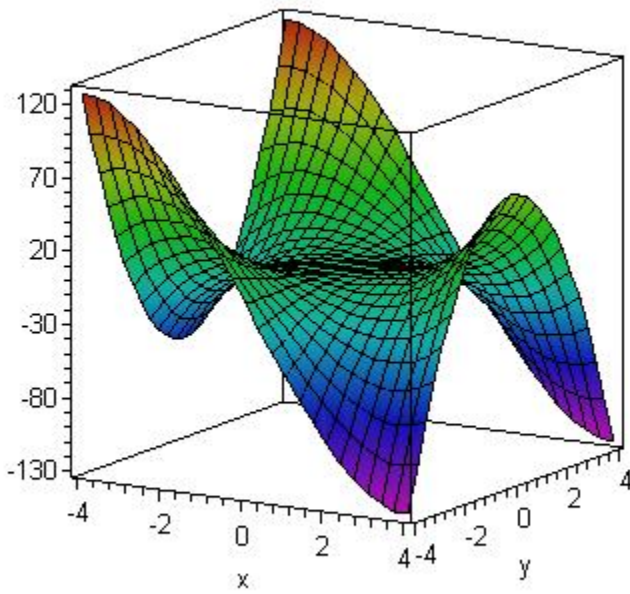
How they go together



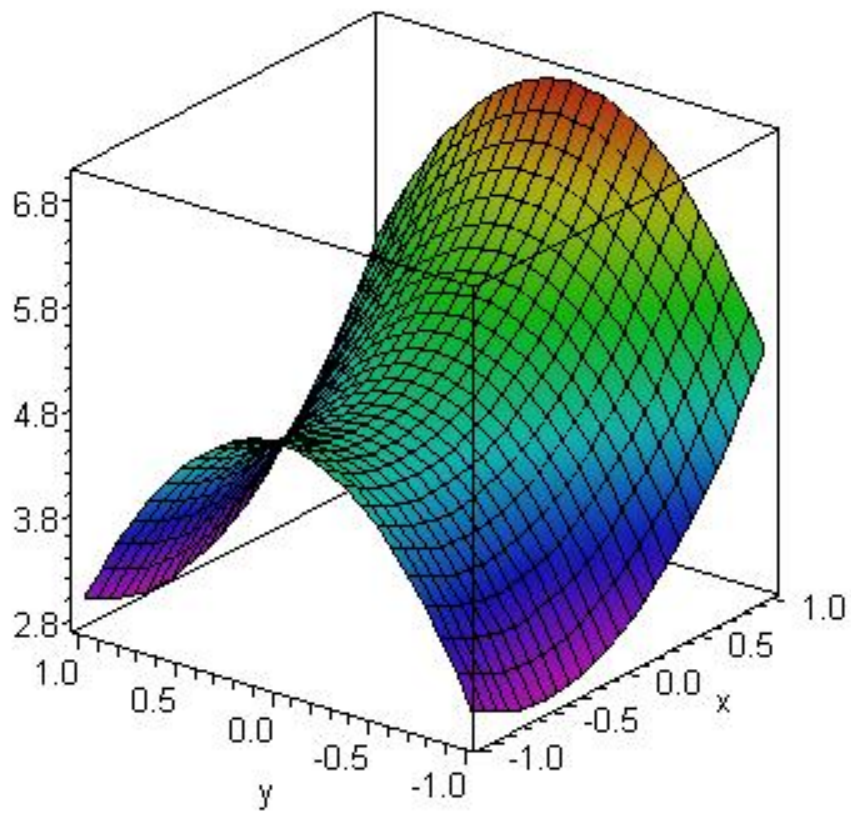
Graph for in-class example



## Monkey Saddle



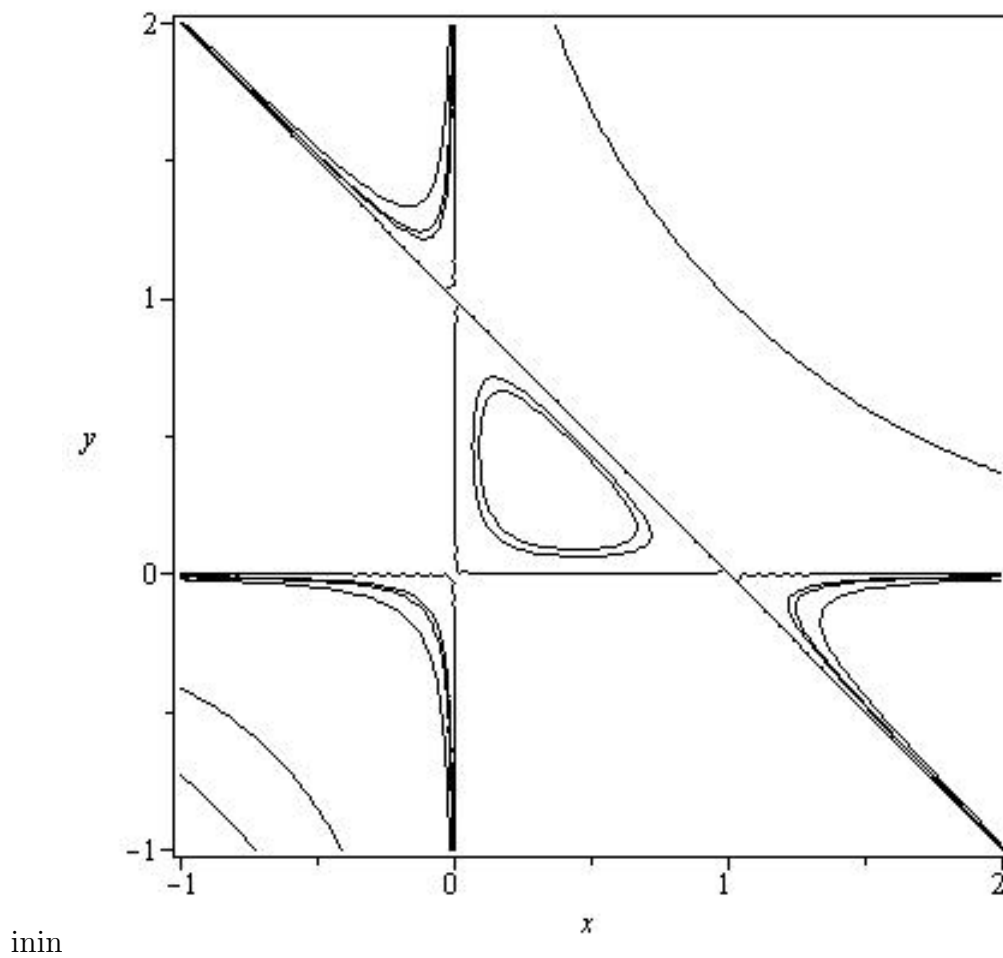
## Global Max example



## Extra Practice

With  $g(x, y) = xy(1 - x - y)$

| Point        | $D$   | $g_{xx}$ | Result    |
|--------------|-------|----------|-----------|
| $(0, 0)$     | $-1$  | N/A      | Saddle    |
| $(1, 0)$     | $-1$  | N/A      | Saddle    |
| $(0, 1)$     | $-1$  | N/A      | Saddle    |
| $(1/3, 1/3)$ | $1/3$ | $-2/3$   | Local Max |





Example:

$$f(x, y) = x^2 y e^{-x^2 - y^2}$$

| Point               | $D$       | $f_{xx}$    | Result       |
|---------------------|-----------|-------------|--------------|
| $(0, y)$            | 0         | 0           | Undetermined |
| $(1, 1/\sqrt{2})$   | $8e^{-3}$ | $-\sqrt{2}$ | Local Max    |
| $(1, -1/\sqrt{2})$  | $8e^{-3}$ | $\sqrt{2}$  | Local Min    |
| $(-1, 1/\sqrt{2})$  | $8e^{-3}$ | $-\sqrt{2}$ | Local Max    |
| $(-1, -1/\sqrt{2})$ | $8e^{-3}$ | $\sqrt{2}$  | Local Min    |

