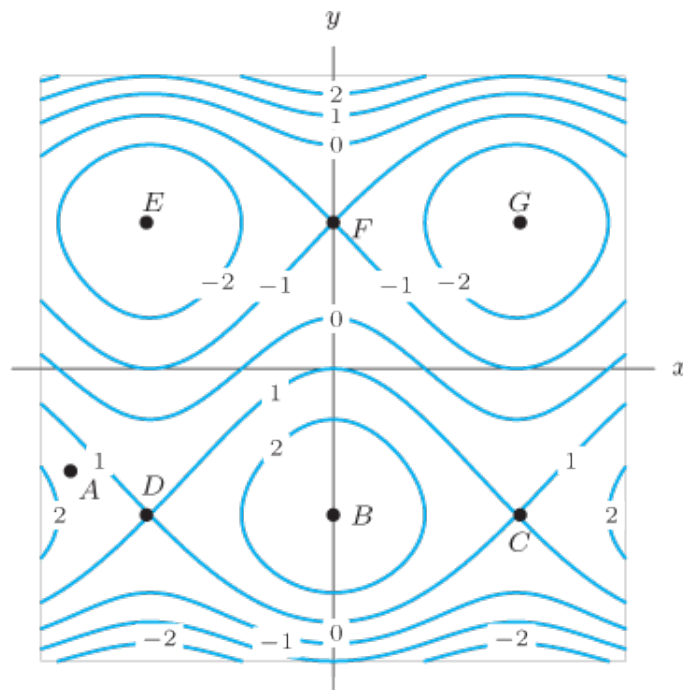


15.1 Critical Points - Local Extrema and Saddle Points

Name:

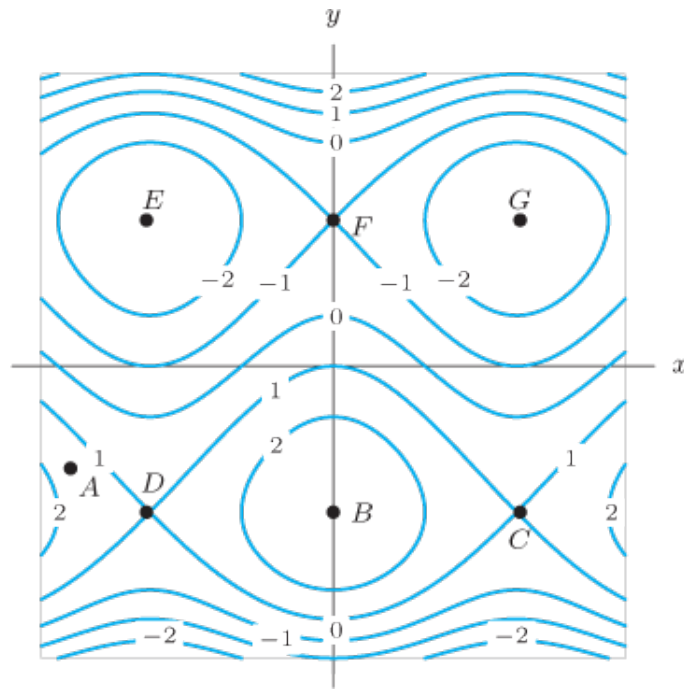
Date:

P 2. Which of the points A, B, C in the figure below appear to be critical points? Classify those that are critical points.



P 3. Which of the points D, E, F in the figure below appear to be

- (a) Local maxima?
- (b) Local minima?
- (c) Saddle points?



P 9. Find the critical points of $f(x, y) = 5 + 6x - x^2 + xy - y^2$ and classify them as local maxima, local minima, saddle points, or none of these.

P 24. Let $f(x, y) = kx^2 + y^2 - 4xy$. Determine the values of k (if any) for which the critical point $(0, 0)$ is:

- (a) A saddle point.
- (b) A local maximum.
- (c) A local minimum.

P 37.

- (a) Find the critical points of $f(x, y) = (x^2 - y)(x^2 + y)$.
- (b) Show that at the critical point, the discriminant $D = 0$, so the second-derivative test gives no information about the nature of the critical point.
- (c) Sketch contours near the critical point to determine whether it is a local maximum, a local minimum, a saddle point, or none of these.