**Name:** _____          **Surface Color:** _____

**Task Master:** _____          **Cynic:** _____          **Recorder:** _____

## The Hot Plate

*Working in small groups (3 or 4 people), solve as many of the problems below as possible. Try to resolve questions within the group before asking for help. Each group member should then write up solutions in their own words; please do not use this sheet for that purpose, but* **please turn in this sheet as well.** *Show your work! Explain why your answers work.*

**On your Marks:** Torches heat a thin $10'' \times 10''$ aluminum plate between $100°F$ and $106°F$. Your surface represents the plate's temperature. Label two points on the surface for each condition below:

| |
|---|
| A) $\frac{\partial T}{\partial x} < 0$ and $\frac{\partial T}{\partial y} < 0$ |
| C) $\frac{\partial T}{\partial x} < 0$ and $\frac{\partial T}{\partial y} > 0$ |

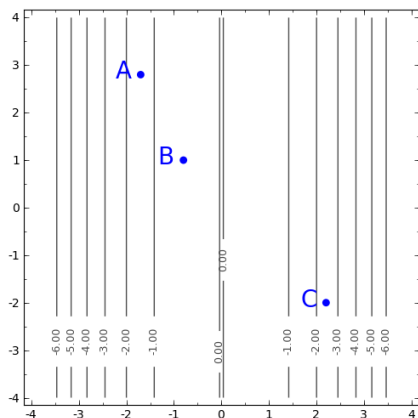| |
|---|
| B) $\frac{\partial T}{\partial x} > 0$ and $\frac{\partial T}{\partial y} < 0$ |
| D) $\frac{\partial T}{\partial x} = 0$ and $\frac{\partial T}{\partial y} > 0$ |

**Get Set:** Pick a point on your surface satisfying (B) above. Using the measurement tool, find the rates $\frac{\partial T}{\partial x}$ and $\frac{\partial T}{\partial y}$ at your point. (1 vertical inch = $1°F$) Include units.

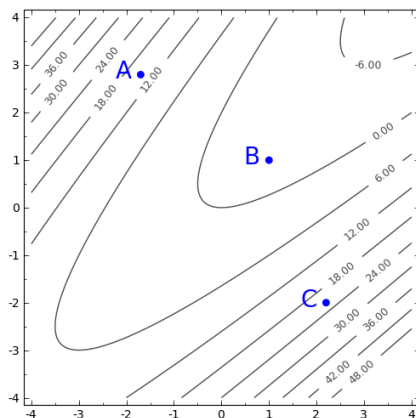$$\frac{\partial T}{\partial x} = \underline{\hspace{3cm}} \qquad\qquad \frac{\partial T}{\partial y} = \underline{\hspace{3cm}}$$

**Go:** For each contour map below, rank the points based on the value of $\frac{\partial T}{\partial x}$ or $\frac{\partial T}{\partial y}$ at each point.
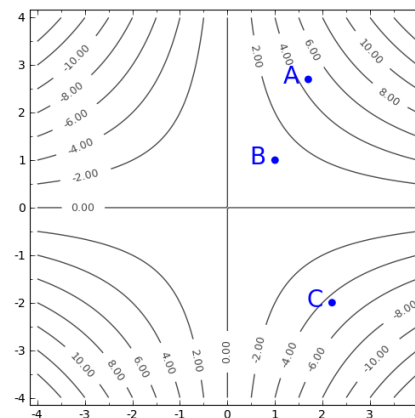


$\frac{\partial T}{\partial x}$ Neg. ____ ____ ____ Pos.          $\frac{\partial T}{\partial x}$ Neg. ____ ____ ____ Pos.          $\frac{\partial T}{\partial x}$ Neg. ____ ____ ____ Pos.

$\frac{\partial T}{\partial y}$ Neg. ____ ____ ____ Pos.          $\frac{\partial T}{\partial y}$ Neg. ____ ____ ____ Pos.          $\frac{\partial T}{\partial y}$ Neg. ____ ____ ____ Pos.