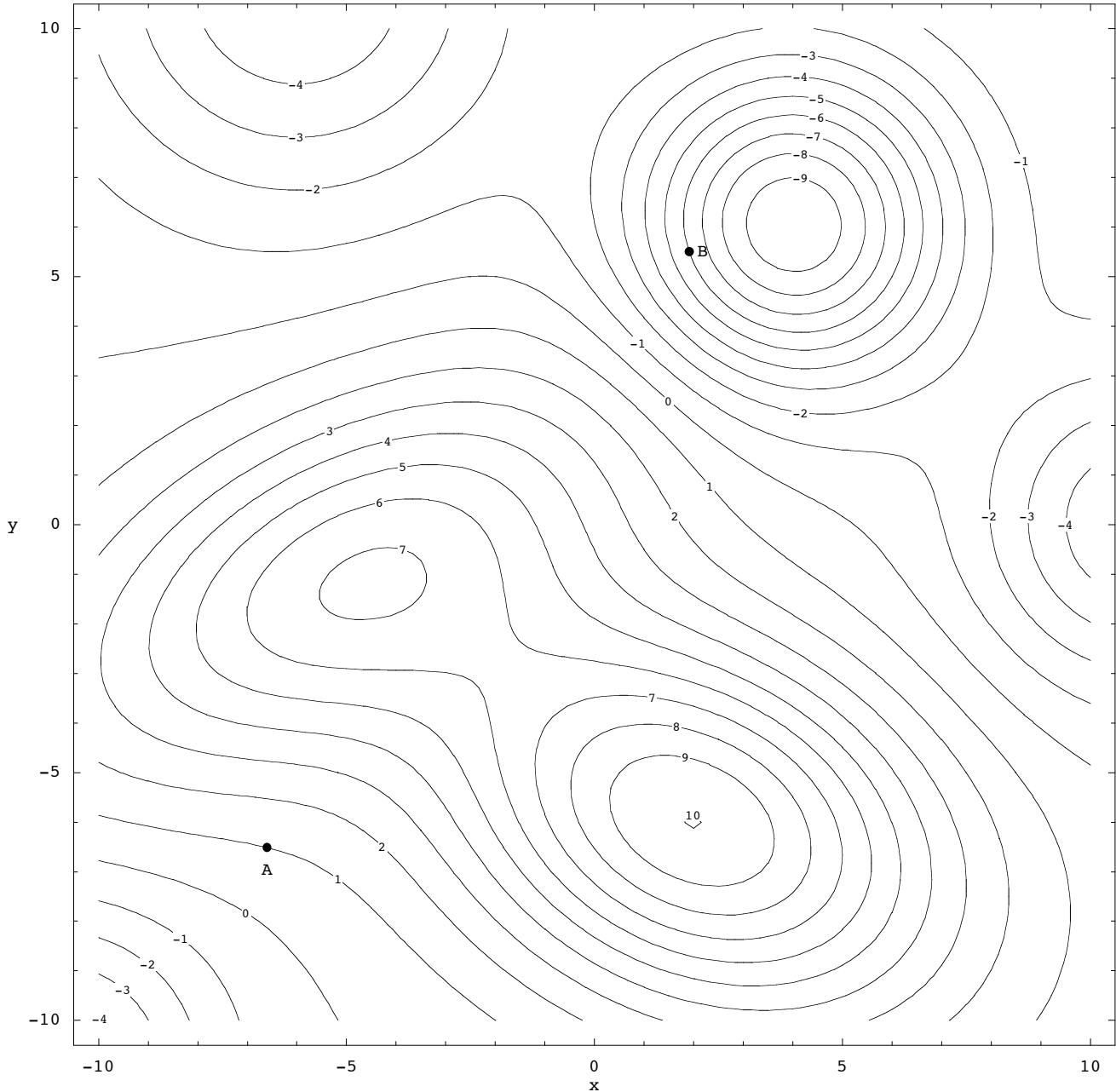# Greatest rate of change

The plot above shows level curves for a function $f:\mathbb{R}^2 \to \mathbb{R}$. It might be helpful to think of each output as the temperature (in degrees Celsius) at a point in the plane (with distances measured in meters).

1. For the point A, estimate the direction of the greatest rate of change in outputs $f(x,y)$ with respect to changes in inputs (x,y).

2. For the point A, estimate the magnitude of this greatest rate of change.

3. At the point A, draw a vector in the direction of the greatest rate of change having magnitude equal to that rate of change. Note that you will need to choose a separate scale for rate of change. For example, with the temperature interpretation, rate of change has units of degrees Celsius per meter while the scales on the x and y axes are in meters.

4. For the point B, estimate the direction of the greatest rate of change in outputs $f(x,y)$ with respect to changes in inputs (x,y).

5. For the point B, estimate the magnitude of this greatest rate of change.

6. At the point A, draw a vector in the direction of the greatest rate of change having magnitude equal to that rate of change. Use the scale you chose in #3.