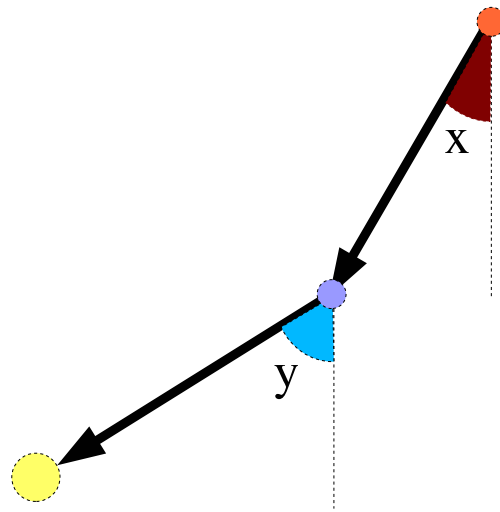## Lecture 17: Extrema

1 Find all the critical points of $f(x, y) = x^2 y^2 - x^2 - y^2$ and classify them.

Critical point:	$D = f_{xx} f_{yy} - f_{xy}^2$	f_{xx}	nature
$(x, y) =$	$D =$	$f_{xx} =$	
$(x, y) =$	$D =$	$f_{xx} =$	
$(x, y) =$	$D =$	$f_{xx} =$	
$(x, y) =$	$D =$	$f_{xx} =$	
$(x, y) =$	$D =$	$f_{xx} =$	

The potential energy of a double pendulum is the function

$$f(x,y) = -\cos(x) - \cos(y) .$$

At the critical points of this function, the pendulum is at rest. Find them and classify them. Where are the minima, maxima and saddle points?

Critical point:	$D = f_{xx}f_{yy} - f_{xy}^2$	f_{xx}	nature
$(x,y) =$	$D =$	$f_{xx} =$	
$(x,y) =$	$D =$	$f_{xx} =$	
$(x,y) =$	$D =$	$f_{xx} =$	
$(x,y) =$	$D =$	$f_{xx} =$	