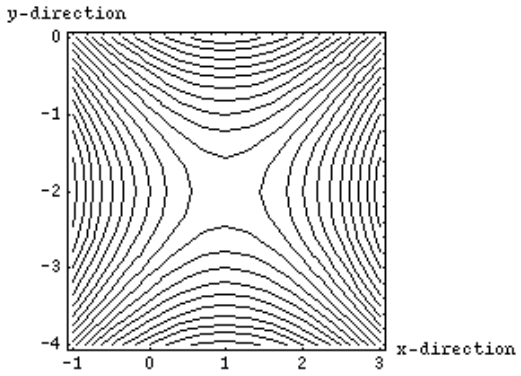
PRINT NAME: SOLUTIONS

Calculus IV [2443–002] Quiz I

Q1]... Which one of the four functions listed below has the following level curves?



1. $f(x,y) = (x+1)(y-2)$. **NO** – Level curves are hyperbolae with asymptotes parallel to the axes, and centered on $(-1,2)$.

2. $g(x,y) = (x-1)(y+2)$. **NO** – Level curves are hyperbolae with asymptotes parallel to the axes, and centered on $(1,-2)$.

3. $h(x,y) = (x+1)^2 - (y-2)^2$. **NO** – Level curves are hyperbolae with asymptotes parallel to $y = \pm x$, and centered on $(-1,2)$.

4. $k(x,y) = (x-1)^2 - (y+2)^2$. **YES** – Level curves are hyperbolae with asymptotes parallel to $y = \pm x$, and centered on $(1,-2)$.

Q2]... Compute the first and second order partial derivatives for the function

$$f(x,y) \;=\; \cos(xy)\,.$$

Answer: There are two first order partial derivatives and four second order partial derivatives. The mixed second order partial derivatives are equal by Clairaut's Theorem, so we get a total of five answers.

$$\begin{aligned} f_x(x,y) &= -y\sin(xy) \\ f_y(x,y) &= -x\sin(xy) \\ f_{xx}(x,y) &= -y^2\cos(xy) \\ f_{xy}(x,y) = f_{yx}(x,y) &= -\sin(xy) - xy\cos(xy) \\ f_{yy}(x,y) &= -x^2\cos(xy) \end{aligned}$$