Worksheet 3/10/2025

Let $f(x, y) = -x + xy + y^2$. Our goal is to find min/max of $f(x, y)$ on the closed triangular region D with vertices at $(-3, 0)$, $(-2, 2)$, $(0, 0)$.

Step 0: Sketch the region D.

Step 1: find all critical points of f in D.

Step 2: find min/max of f on the boundary of D.

(a) Find the equation of the line segment from $(-3, 0)$ to $(0, 0)$.

(b) Rewrite the formula of $f(x, y)$ when (x, y) lies on this line segment.

(c) Find min/max of $f(x, y)$ when (x, y) lies on this line segment.

(d) Find the equation of the line segment from $(0,0)$ to $(-2,2)$.

(e) Rewrite the formula of $f(x,y)$ when (x,y) lies on this line segment.

(f) Find min/max of $f(x,y)$ when (x,y) lies on this line segment.

(g) Find the equation of the line segment from $(-3,0)$ to $(-2,2)$.

(h) Rewrite the formula of $f(x,y)$ when (x,y) lies on this line segment.

(i) Find min/max of $f(x,y)$ when (x,y) lies on this line segment.

Step 3: compare the values of f at the critical points with its min/max on the boundary.

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