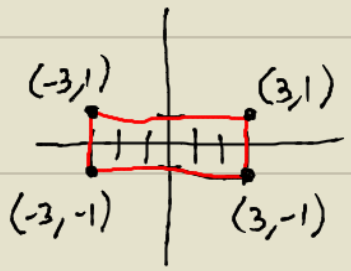
9. $f(x,y) = x^2 + xy$, $-3 \le x \le 3$, $-1 \le y \le 1$



① $f_x = 2x + y$ $\quad f_y = x$

$2x + y = 0$ $\quad x = 0$

CRIT POINT: $\overset{x}{(0}\ \overset{y}{0)}$

②

$x = -3$	$x = 3$	$y = -1$	$y = 1$
$f(y) = 9 - 3y$	$f(y) = 9 + 3y$	$f(x) = x^2 - x$	$f(x) = x^2 + x$
$f'(y) = -3$	$f'(y) = 3$	$f'(x) = 2x - 1$	$f'(x) = 2x + 1$
NO CRIT. PT.	NO C.P.	$2x - 1 = 0$	$2x + 1 = 0$
		$2x = 1$	$2x = -1$
		$x = \frac{1}{2}$	$x = -\frac{1}{2}$

$(\frac{1}{2}, -1)$ $\quad (-\frac{1}{2}, 1)$

③ $(-3,-1)$ $\quad (-3,1)$ $\quad (3,1)$ $\quad (3,-1)$

ABS. MIN $(\frac{1}{2}, -1, -\frac{1}{4})$ $(-\frac{1}{2}, 1, -\frac{1}{4})$

ABS. MAX $(-3, -1, 12)$ $(3, 1, 12)$

$(0,0)$

$f(0,0) = 0^2 + 0(0)$

$= 0$

$\boxed{0}$

$(\frac{1}{2}, -1)$

$f(\frac{1}{2}, -1) = (\frac{1}{2})^2 + (\frac{1}{2})(-1)$

$= \frac{1}{4} - \frac{1}{2}$

$= \frac{1}{4} - \frac{2}{4}$

$= -\frac{1}{4}$

$\boxed{-\frac{1}{4}}$ ← ABS MIN

$(-\frac{1}{2}, 1)$

$f(-\frac{1}{2}, 1) = (-\frac{1}{2})^2 + (-\frac{1}{2})(1)$

$= \frac{1}{4} - \frac{1}{2}$

$= -\frac{1}{4}$

$\boxed{-\frac{1}{4}}$ → ABS MIN

$(-3,-1)$

$f(-3,-1) = (-3)^2 + (-3)(-1)$

$= 12$

$\boxed{12}$ ← ABS MAX

$(-3,1)$

$f(-3,1) = (-3)^2 + (-3)(1)$

$= 6$

$\boxed{6}$

$(3,-1)$

$f(3,-1)$

$= 3^2 + (3)(-1)$

$= \boxed{6}$

$(3,1)$

$f(3,1)$

$= 3^2 + 3(1)$

$= \boxed{12}$ ← ABS MAX