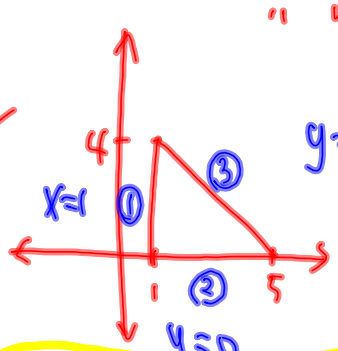
Find the absolute maximum and minimum values of on the set .

30. $f(x, y) = 3 + xy - x - 2y$, D is the closed triangular region with vertices $(1, 0)$, $(5, 0)$, and $(1, 4)$

abs. max = 2
" min = −2

Local

$f_x = 0 = y - 1$
$f_y = 0 = x - 2$
} c.p. $(2,1)$ ✓
$f = 1$



① $x = 1$, $0 \le y \le 4$

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

max @ (1,0) f = 2
min @ (1,4) f = −2

② $y = 0$, $1 \le x \le 5$

$f(x,0) = 3 - x$

max @ (1,0) f = 2
min @ (5,0) f = −2

③ $y = -x + 5$, $1 \le x \le 5$

$f(x, -x+5) = 3 + x(-x+5) - x - 2(-x+5)$
$= 3 - x^2 + 5x - x + 2x - 10$
$= -x^2 + 6x - 7$

$\frac{df}{dx} = -2x + 6 = 0$
$x = 3$

max @ (3,2) f = 2
min @ (1,4) f = −2
min @ (5,0) f = −2

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