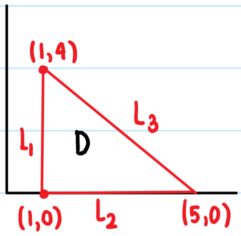
1) Find the absolute max and mix of $f(x,y) = xy - x - 2y + 3$ on the closed triangular region w/ vertices $(1,0), (5,0), (1,4)$.



- The region D is closed and bounded and f is a polynomial and hence continuous.
- Therefore an abs max and min exist.

1) $f_x = y - 1$, $f_y = x - 2$ and setting $f_x = f_y = 0$ gives $x = 2, y = 1$.
So $(2,1)$ is the only critical point, where $f(2,1) = 1$.

Along L_1 : $x = 1$ and $\underbrace{f(1,y)}_{h(y)} = 2 - y$, $0 \le y \le 4$.

- $h'(y) = -1 \neq 0$ so no critical point. (Since h is a line, max and min occur at the endpoints).

Therefore max & min occur on the ends.

$h(0) = f(1,0) = 2$ max.

$h(4) = f(1,4) = -2$ min.

Along L_2 : $y = 0$, $f(x,0) = 3 - x$, $1 \le x \le 5$

The $f(x,0) = 3 - x$ is a decreasing function in x, so

$f(1,0) = 2$ maximum

$f(5,0) = -2$ minimum

Along L_3 : $y = 5 - x$

$\underbrace{f(x, 5-x)}_{k(x)} = -x^2 + 6x - 7 \qquad 1 \le x \le 5$

$k'(x) = -2x + 6 = 0 \Rightarrow x = 3$

$k(3) = f(3,2) = \underset{max}{2}$, $k(1) = f(1,4) = -2$, $k(5) = f(5,0) = \underset{min}{-2}$

Thus abs max of f on D is $f(1,0) = f(3,2) = 2$ and abs min is $f(1,4) = f(5,0) = -2$.