

Math 233 Warm Up Problems

September 29, 2009

1. Graph the following sets in $\mathbb{R}^2$.

- (a) $\{(x, y) | 1 < x < 3\}$
- (b) $\{(x, y) | 1 < y < 3\}$
- (c) $\{(x, y) | 1 < x, y < 3\}$
- (d) $\{(x, y) | 1 \leq x < 3\}$
- (e) $\{(x, y) | 1 < y \leq 3\}$
- (f) $\{(x, y) | 1 \leq x, y \leq 3\}$
- (g) $\{(x, y) | 1 \leq x \leq y \leq 5\}$

Lecture Problems

2. Determine if the following sets in $\mathbb{R}$ are closed, open, neither open nor closed, bounded or unbounded.

- (a) $(1, 10)$
- (b) $[2, 10]$
- (c) $[1, 10)$
- (d) $[1, 10] \cup [11, 21]$
- (e) $(1, \infty)$
- (f) $[1, \infty)$
- (g) $\{1, 2, 3, 4, \dots\}$
- (h) $(1, 2) \cup (3, 4) \cup (5, 6) \cup \dots$

3. Determine if the following sets are closed, open, neither open nor closed, bounded or unbounded.

- (a) $\{(x, y) | 1 < x < 3\}$
- (b) $\{(x, y) | 1 < y < 3\}$
- (c) $\{(x, y) | 1 < x, y < 3\}$
- (d) $\{(x, y) | 1 \leq x < 3\}$
- (e) $\{(x, y) | 1 < y \leq 3\}$
- (f) $\{(x, y) | 1 \leq x, y \leq 3\}$
- (g) $\{(x, y) | 1 \leq x \leq y \leq 5\}$

4. Find the absolute maximum and absolute minimum of the function $f(x, y) = 2x^2 - 3xy + 6x$ on the rectangle $\{(x, y) | -1 \leq x \leq 2, -1 \leq y \leq 4\}$.
- (a) Find all critical points inside the rectangle.
 - (b) Find the max/min of the function for $x = -1, -1 \leq y \leq 4$.
 - (c) Find the max/min of the function for $x = 2, -1 \leq y \leq 4$.
 - (d) Find the max/min of the function for $y = -1, -1 \leq x \leq 2$.
 - (e) Find the max/min of the function for $y = 4, -1 \leq x \leq 2$.
 - (f) What is the global max and min on the closed rectangle?