HW DUE MONDAY 9/24

MATH 309, SECTION 6

(1) Let $a, b, x, y \in \mathbb{R}$. Prove the following:

   (a) If $-3x + 2 < 29$, then $x > -9$.
   (b) If $a, b \neq 0$ and $a < b$, then $a^3 < b^3$. *(Be careful with negative numbers).*
   (c) Suppose $3x + 2y \leq 5$. If $x > 1$ then $y < 1$.
   (d) Either prove or disprove: If $a < b$, then $a^4 < b^4$.

(2) Use the set notation $\{** \mid **\}$ to write the following sets:

   (a) The set of all positive integers divisible by 3.
   (b) The parabola $y = x^2$ (in $\mathbb{R}^2$).
   (c) The xy-plane in $\mathbb{R}^3$.

For part (1), you may use the following properties:

(1) $a < b \Rightarrow a + c < b + c$
(2) $a < b$ and $c > 0 \Rightarrow ac < bc$
(3) $a < b \Rightarrow -b < -a$
(4) $a < b$ and $b < c \Rightarrow a < c$
(5) (Theorem from class) $0 < a < b \Rightarrow a^2 < b^2$
(6) (Theorem from class) $a < b$ and $c < d \Rightarrow a + c < b + d$