Matemática 4 - TP1

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27 de agosto de 2018

1. *a)* $z \in \mathbb{Z} \leftrightarrow 2z \in \mathbb{Z}$: Falso - $(\exists x)\left(x = \frac{1}{2}\right) \mid (x \notin \mathbb{Z}) \wedge (2x \in \mathbb{Z})$

   b) $z \in \mathbb{Z} \leftrightarrow -z \in \mathbb{N}$: Falso - $(\exists x)\,(x = 1) \mid (x \in \mathbb{Z}) \wedge (-x \notin \mathbb{N})$

   c) $z \in \mathbb{Z} \leftrightarrow z^2 \in \mathbb{Z}$: Verdadero

   d) $z \in \mathbb{Z} \leftrightarrow z^2 = 1 \in \mathbb{Z}$: Falso - $(\exists x)\,(x = 2) \mid (x \in \mathbb{Z}) \wedge \left(x^2 = 4 \neq 1\right)$

   e) $z \in \mathbb{N} \leftrightarrow z^2 \in \mathbb{N}$: Verdadero

   f) $z \in \mathbb{N} \leftrightarrow -z \notin \mathbb{N}$: Falso - $(\exists x)\left(x = \frac{1}{2}\right) \mid (-x \notin \mathbb{N}) \wedge (x \notin \mathbb{N})$

   g) $z \in \mathbb{N} \leftrightarrow 2z \in \mathbb{N}$: Falso - $(\exists x)\left(x = \frac{1}{2}\right) \mid (x \notin \mathbb{N}) \wedge (2x \in \mathbb{N})$

   h) $z \in \mathbb{N} \leftrightarrow z + 1 > 0$: Falso - $(\exists x)\left(x = \frac{1}{2}\right) \mid (x \notin \mathbb{N}) \wedge (x + 1 > 0)$

2. *a)* $\{\ z \in \mathbb{Z} \mid z = 2x + 1 \ \textbf{para} \ -5 \leq x \leq 4\}$
   $\{\ z \in \mathbb{Z} \mid z = 2x - 1 \ \textbf{para} \ -4 \leq x \leq 5\}$

   b) $\{\ z \in \mathbb{Z} \mid z = 4x + 3 \ \textbf{para} \ -3 \leq x \leq 1\}$
   $\{\ z \in \mathbb{Z} \mid z = 4x - 3 \ \textbf{para} \ -1 \leq x \leq 3\}$

   c) $(\exists m \in \mathbb{Z})\,(\exists t \in \mathbb{Z})\,(4m + 1 = 4t + 3)$?
   $(\exists m \in \mathbb{Z})\,(\exists t \in \mathbb{Z})\left(m = \frac{2t+1}{2}\right)$?
   $(\forall t \in \mathbb{Z})\,(2t + 1 \ \texttt{es impar})$
   $\therefore (\nexists m \in \mathbb{Z})\,(\exists t \in \mathbb{Z})\,(4m + 1 = 4t + 3)$
   No hay números enteros que puedan escribirse de las dos formas

   d) Supongo que $(\exists m \in \mathbb{Z})\,(m \ \texttt{es par} \wedge m \ \texttt{es impar})$
   Sea $k \in \mathbb{Z}$ cualquiera, $m = 2k + 1$ (por ser impar)
   Como m es par, $2|m$. Es decir $(\exists t \in \mathbb{Z})\,(m = 2 * t)$
   $2k + 1 = 2t$
   $t = k + \frac{1}{2}$
   Como $\frac{1}{2} \notin \mathbb{Z} \rightarrow t \notin \mathbb{Z}$
   $t \in \mathbb{Z} \wedge t \notin \mathbb{Z}$
   $\therefore (\nexists m \in \mathbb{Z})\,(m \ \texttt{es par} \wedge m \ \texttt{es impar})$