MATH310 Groupwork 2022-07-14

NAME:

UID:

1. Determine with justification if the following are true or false:

   (a) $\exists n \in \mathbb{Z}$, $(2n - 1)/5 \in \mathbb{Z}$.
   Solution:

   (b) $\exists! n \in \mathbb{Z}$, $(2n - 1)/5 \in \mathbb{Z}$.
   Solution:

   (c) $\forall n \in \mathbb{Z}$, $(2n - 1)/5 \in \mathbb{Z}$.
   Solution:

   (d) $\exists x \in \mathbb{Z}, \exists y \in \mathbb{R}, x^2 + y^2 = 3$
   Solution:

   (e) $\sim (\exists x \in \{3, 5, 11\}, \exists y \in \{3, 5, 11\}, xy - 2 \text{ is not prime})$
   Solution:

2. Distribute the negation signs for each of the following, adjusting other symbols accordingly.

(a) $\sim (\forall x, P(x)) \equiv$?

   Solution:

(b) $\sim (\exists x, Q(x)) \equiv$?

   Solution:

(c) $\sim (\forall x, \exists y, P(x,y) \vee Q(x,y)) \equiv$?

   Solution:

(d) $\sim (\exists x, \forall y, P(x,y) \wedge (\sim Q(x,y))) \equiv$?

   Solution:

(e) $\sim (\exists x, \forall y, P(x,y) \rightarrow Q(x,y)) \equiv$?

   Solution:

3. Negate the following.

(a) For every year there is at least one day when it's sunny.

   Solution:

(b) For every week there is at least one day where it rains or snows.

   Solution: