Exercise 12 – Part 1

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Problem 1.

Solution. (a)

$$\neg \exists z \forall y \forall x (T(x, y, z))$$
$$\equiv \forall z \neg \forall y \forall x (T(x, y, z))$$
$$\equiv \forall z \exists y \neg \forall x (T(x, y, z))$$
$$\equiv \forall z \exists y \exists x (\neg T(x, y, z))$$

(b)

$$\neg ((\exists x \exists y P(x, y)) \wedge (\forall x \forall y Q(x, y)))$$
$$\equiv ((\neg \exists x \exists y P(x, y)) \vee (\neg \forall x \forall y Q(x, y)))$$
$$\equiv ((\forall x \neg \exists y P(x, y)) \vee (\exists x \neg \forall y Q(x, y)))$$
$$\equiv ((\forall x \forall y \neg P(x, y)) \vee (\exists x \exists y \neg Q(x, y)))$$

$\square$