Math 2001 - Assignment 5

Due February 23, 2018

(1) Negate the following sentences:
   (a) If $A \subseteq B$ and $B \subseteq C$, then $A \subseteq C$.
   (b) $\exists x \in \mathbb{R} : x^2 = -1$
   (c) $\forall r \in \mathbb{R} : \sin(r\pi) = 0 \Leftrightarrow r$ is an integer
   (d) There exists a right triangle that is not isosceles.
   (e) $\forall x \in \mathbb{R}^+ \ \exists n \in \mathbb{N} : \ \frac{1}{n} \leq x$.
   (f) $\exists m \in \mathbb{N} \ \forall p \in \mathbb{N} : p$ prime $\Rightarrow p \leq m$
(2) How many lists of length 4 are there with entries from A,. . . , Z if
   (a) repetition is allowed,
   (b) repetition is not allowed,
   (c) repetition is not allowed and the list must contain A,
   (d) repetition is allowed and the list must contain A.
(3) [1, Section 3.1]: Exercise 4
(4) How many standard Colorado license plates (3 numbers followed by 3 letters) have at least one number or letter repeated?
(5) How many different 5-card hands form a Full House? Pick 5 cards from a standard 52-card deck such that 3 are of a kind and the remaining 2 are of a kind.

References

[1] Richard Hammack. The Book of Proof. Creative Commons, 2nd edition, 2013. Available for free: `http://www.people.vcu.edu/~rhammack/BookOfProof/`