CS 11 Quiz #4

1 Let $m \in \mathbb{Z}$

WTS $x \equiv_m y$, $y \equiv_m z \Rightarrow x \equiv_m z$

Proof. Suppose $x \equiv_m y$ and $y \equiv_m z$. This implies $m \mid (y-x)$ and $m \mid (z-y)$

then $y - x = ma$ for some integer a

and $z - y = mb$ for some integer b

But then, $z - x = z - y + y - x$

$= ma + mb$

$= m(a+b)$

Since integers are closed under addition, $a+b \in \mathbb{Z}$

So $m \mid (z-x)$, which implies $x \equiv_m z$. Therefore

$\equiv_m$ is transitives. ■

2 Write down every equivalence relation on set $\{a, b, c\}$

Relation R on set S is equivalance relation if R is reflexive, symmetric and transitive for set $S = \{a, b, c\}$

$\{a\}\{b\}\{c\}$ aRa, bRb, cRc

$\{a, b\}\{c\}$ aRb, aRa, cRc, bRb, bRa

$\{b, c\}\{a\}$ bRb, bRc, aRa, cRc, cRb

$\{a, c\}\{b\}$ aRa, aRc, cRa, bRb, cRc

$\{a, b, c\}$ aRa, aRb, aRc
bRa, bRb, bRc
cRa, cRb, cRc