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CNC - Formal Languages
Assignment 2

14. Let X_1, …, X_n be a partition of a set X. Define an equivalence relation ≡ on X. whose equivalence classes are precisely the sets X_1, …, X_n.

If each element is related to itself
X_n R X_n if X_n = X_n
[X_n] = { X_n }. This relation partitions X into X_n equivalence classes.

20. Prove that there are an uncountable number of total functions from N to {0, 1}

Using Cantor's diagonalization argument.
Let S = all of the functions from N to {0,1}
S = { f_1, f_2 }
f(n) = 0 if f_n (n) = 1
f(n) = 1 if f_n (n) = 0
f_n != f

30. Give a recursive definition of the relation greater than on N x N using the successor operator \`s\`.

```
> gt' a b
>   | a == 0 = False
>   | a == s b = True
>   | gt a (s b) = True
>   | otherwise = False

> s n = n + 1
```

33. Give a recursive definition of multiplication of natural numbers using the operations \`s\` and addition.

x * 0 = 0
x * S(y) = (x * y) + x

As close as I can come in Haskell:

```
> mult a 0 = 0
> mult a b = (mult a (pred b)) + a

> pred 1 = 0
> pred n = n - s(0)
```

40.
47.