Self-graded homework #1

CS 353—Architecture and Compilers—Fritz Ruehr

1. Convert each of the following numerals from one base to the other, as given:

   503_{oct} = _____ dec

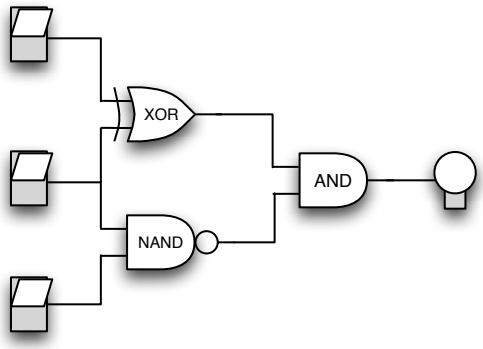
   143_{dec} = _____ bin

   $AF7_{hex}$ = _____ bin

2. Assume we are working in a fixed-width field of 6 bits; convert the following numerals from the given representation to the other:

standard/decimal	*two's complement*
`-23`	_____
_____	`110010`
`19`	_____

3. Consider this circuit and provide a truth table, with columns for the inputs (call them `P`,`Q` and `R`, in that order) and for the results of the main formula—but *use only* `AND`, `OR` *and* `NOT` *operators (&, | and ~) in your formula!*



4. Consider this truth table and determine a formula which will give the results shown:

P	Q	R	
0	0	0	0
0	0	1	1
0	1	0	0
0	1	1	1
1	0	0	1
1	0	1	0
1	1	0	1
1	1	1	1

5. Take a look at this Unicode string. The letters `J` and `K` have standard ASCII codes; assume the other three symbols have 16-bit codes. Using `0`s, `1`s and `X`s, write out a "template" for the UTF-8 encoding of the sequence (i.e., use `X` for the unknown code parts):

J♥≠K♠