CJ Hess
Paper Homework 2

Problem 1:
Code:

```python
people = ['Bob', 'John', 'Smith']

def distinct(L): # predicate? What does it do?
    if len(L) < 2:
        return True
    else:
        j = L.pop() # pops last element
        if j in L:
            return False
        return distinct(L)


def heardOf(p1, p2):
    global carpenter, painter, plumber
    if p1 == p2 or (p1 == plumber and p2 == painter):
        return False

    return True

def earnsMore(p1,p2):
    global carpenter, painter, plumber
    if (p1 == p2) or ((p1 == "John") and (p2 == "Bob")) or ((p1 == painter) and (p2 == plumber)):
        return False
    return True

def solve2():
    global carpenter, painter, plumber
    for carpenter in people:
        for painter in people:
            for plumber in people:
                if distinct([carpenter, painter,plumber]):
                    sol = not heardOf("Smith", "Bob")
                    sol = sol and earnsMore("Bob", "John")
                    sol = sol and earnsMore(plumber, painter)
                    sol = sol and heardOf(painter, carpenter)
                    sol = sol and heardOf(carpenter, plumber)
                    sol = sol and heardOf(painter, plumber)
                    if sol:
                        print("carpenter =",carpenter," painter =",\
                                painter," plumber =",plumber)

solve2()

```

Output:

```
python -u "/Volumes/cjhbh3/cs1200/homework2-problem1.py"

The default interactive shell is now zsh.
To update your account to use zsh, please run `chsh -s /bin/zsh`.
For more details, please visit https://support.apple.com/kb/HT208050.
(base) CJs-MacBook-Pro:~ cj_hess510$ python -u "/Volumes/cjhbh3/cs1200/homework2-problem1.py"
('carpenter =', 'John', ' painter =', 'Bob', ' plumber =', 'Smith')
(base) CJs-MacBook-Pro:~ cj_hess510$
```

Problem 2:
Code:

```
def magic(x):
  while (x != 1):
    print(x)
    if (x % 2 == 0):
      x = x / 2
    else:
      x = (x*3) + 1

  print(x)


magic(935713936928023O2)
```

Output:
attached the file with assignment, too big to screenshot

Problem 3:

Proof:

```
for a | b, a | c, b | d
b = ar
c = as
d = bk = ark
r,s,k are all integers

7c^2d - 3bc + 5d
7(as)^2(bk) - 3(ar)(as) + 5(bk)
7(as)^2(ark) - 3(ar)(as) + 5(ark)

Since r,s,k are integers:
rk is an integer
So a | (7c^2d - 3bc + 5d) by definition of divisibility
```