

1. . and .. directories

2. A. Increases to 5

B. Nothing happens to the link count

C. possible; ln -s . [some_link_name], ln -s bar s1

D. Symbolic link s1 is broken/left dangling.

3. Sets the bash variable a to 2. It then substitutes every instance of the string '22' from every line in input.txt to the letter 'f'.

4. Appends all directory contents that start with a '.' (except . and ..) into myfile and appends all errors from stderr into myfile.

5.

```
echo "line 1: $1"
```

```
echo 'line 2: $2'
```

```
echo "line 3: $@"
```

7. `grep -E "^[0-9]+,\\"[- &A-Za-z]*\\"$"`

8. ['strawberry', 'watermelon']

The assignment `new_fruits = []` changes the binding of the local variable `new_fruits` to another object at a different memory location, i.e., the pointer value of `new_fruits` gets changed, while the variable `y` in the outer scope still points to the original object at the original memory location. (2pt, essentially one point for touching on the concept of **distinct memories** and another for touching on the separation of the two variables `new_fruits` and `y` as **distinct references to those memories**)

1pt for correct value of list `y`

9.

```
def find_melons(self):
    indices = {}
    for i, fruit in enumerate(self.fruits):
        if fruit in FruitSalad.melons:
            indices[fruit] = i
    return indices
```

10.

```
from copy import copy
```

```
def remove_melons(self):
    new_fruits = copy(self.fruits)
    for melon, index in self.find_melons().items():
        new_fruits.pop(index)
    return new_fruits
```

11.

The function `create_point` returns a dangling pointer as the memory for the local variable `p` on the stack becomes garbage, i.e., `p` goes out of scope, after `create_point` returns.

One fix can be to use `malloc` to allocate a `Point` struct dynamically inside the `create_point` function and return its memory address.

12.

A. Some possibilities:

- Denial of Service.
- The attacker can jumble the bytes of the pdf when the pdf files are sent across the network.

B. They can learn when the files are transmitted, and the location of the transmission. It's hard to get the actual decrypted data of the questions and answers due to encryption.

C. No - home directories are all already synced since they share the same file server

16.

A. Git

B. Varied answers possible, one example is:

One engineer will initialize a central git repo that all of the other engineers will clone off of, and created the 3 original files required. Afterwards, each time a new feature is required, the engineer will first fetch and merge the latest master updates from the central remote into their own local repo. Once they are up-to-date, the engineer will create a new branch for themselves to work on their feature. That branch will contain all of the commits required to create and test that feature. Once the feature is ready, they will publically share their branch and latest commit for review. If agreed upon by the team, they can merge their branch into master. If there is a conflict, the team will always require the branch to be corrected to match the current state of the master.

C. Varied answers possible, some include:

Merge conflicts may not be easy to resolve, too many changes in a single branch will impact the work of other engineers and be hard to merge in, if something happens to the central repo than it will be hard to sync work across, etc.

D.

```
git pull origin master (or git fetch + git merge)
git checkout -b URL_feature
//Make and test changes to server.py
git add server.py
git commit -m "Added new URL path to server.py"
git push -u origin URL_feature
git checkout master
git merge URL_feature
```

17. Example answer:

For a merge commit C, "git log" might print its two parents P1 and P2 consecutively before printing C. P1 and P2 might not be related at all.

18. Example answer:

For each line in the output of P assign the line number to the commit hash as its rank. For each h_parent -> h_child pair in the output of G, check that the rank of h_child is less than the rank of h_parent.