Instructions

The purpose of this drill is to explore file system traversals with the `find` command.

`find` is a tool to scan a set of directories and print out the files that match particular conditions. In its simplest form:

```
$ find dir
```

it will print out all files and directories under `dir`.

Find also takes various *tests*, to filter the files that it prints. For example, this command:

```
$ find dir -type f
```

prints only regular files under `dir`.

You can have multiple tests; by default, they are joined with the *and* operator. So the following:

```
$ find dir -type f -size +1M
```

prints regular files that are at least 1 megabyte.

It also takes *actions*; the default action is `-print`, but you can also use `-exec` to execute a program on each file:

```
$ find dir -type d -exec chmod +x '{}' ';'
```

The `'{}'` will be replaced by the file or directory name, and `';'` terminates the command. This `find` command will set the executable bit on all directories under `dir`. You can also pipe the result of `find` into another program; the `xargs` program reads files or arguments from standard in, and runs a command. So the following is (nearly) equivalent:

```
$ find dir -type d |xargs chmod +x
```

However, if files have spaces or newlines in their names, `xargs` can be confused. For this reason, `find` can print file names separated with null characters instead of newlines, and `xargs` (and other programs) can read such files. So this is better:

```
$ find dir -type d -print0 |xargs -0 chmod +x
```

You can read the full documentation, including examples, in the GNU Find manual; consult that documentation to answer the questions.

For this drill, write `find` command, possibly with `xargs` that will do each of the following.

1. Print all files, directories, etc. owned by user ‘bob’ under the directory `/share`

2. Print all regular files owned by user ‘bob’ under the directory `/share`
3. Print all empty directories under `/usr/src`
4. Set the `setgid` bit on all directories under `/share/project`
5. Make all executable files under `/share/programs` non-writeable.

To answer these questions, you will need to consult the Find documentation to find the appropriate options. **Reading and understanding documentation is part of the pedagogical purpose of this exercise.**