

Grading Instructions for PA4

1. Checking single and double quotes: 5 points (2.5 points each)
echo "Hello world | Life is Good > Great \$"
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2. Simple commands with arguments: 20 points
If commands only w/o arguments work deduct 15 points.
 - a. ls
 - b. ls -l /sbin # should list from the /sbin directory that has many files,
 - c. ls -l -a
 - d. ls -la (this should be same as c)
 - e. ps -aux
 - f. ls -l .. # lists the parent directory
 - g. To check if they wait for the child process, run the following:
sleep 5
This should block the shell for 5 seconds. If the shell comes back immediately, deduct 5 points because they are not using wait().
3. Input/Output redirection (20 points – 10 points each):
 - a. ps -aux > a
 - b. grep /init < a
 - c. grep /init < a > b # grep output should go to file b
If they do not have the last part (i.e., input output redirection in the same line), deduct 5 points
4. Single pipe (10 pts):
Any single pipe command
5. Two or more pipes (20 points):
ps -aux | awk '/init/{print \$1}' | sort -r
ps -aux | awk '/init/{print \$1}' | sort -r | awk '/ro/' | grep ro
ps -aux | awk '{print \$1 \$11}' | sort -r | grep root
6. 2 or more pipes with input and output redirection (5 points):
ps -aux > test.txt
awk '{print \$1 \$11}' < test.txt | head -10 | head -8 | head -7 | sort ` > output.txt
cat output.txt

7. Background processes: 10 points

sleep 1 &
sleep 2 &
sleep 20 &

The prompt should come back immediately, otherwise deduct 5 points. Also, look for the code where they handled background processes. They should get the pid of the child process, put that in a vector or list, and before getting every command they should cycle through each pid in the list with waitpid (pid, 0, WNOHANG). This should not take time at all and they cannot get stuck in a long running process because WNOHANG makes the function non-blocking.

Also, in WSL/Ubuntu subsystem, there is no Zombie processes. So, checking code is the only way to tell if they are using WSL.

Give some partial points for effort. Otherwise, deduct full 10 points if they do not have anything significant about bg processes.

8. Directory processing (5):

- a. `cd ../../`
- b. `cd .`
- c. `cd /home/`
- d. `cd -` # this may require them to use `getcwd()` function, cut the last level directory off, and then `chdir` to the rest. The result is that you navigate to the parent directory

9. Own prompt 5 points and misc: Deduct 5 points if they do not print any prompt. Deduct 2 points if they do not handle the command "jobs"

10. Bonus (10 pts): \$ sign expansion

```
cat /proc/$(ps|grep bash|head -1|awk '{print $1}')/status # for people with linux
```

```
mkdir a
```

```
cd $(ls -l | grep '^d'| head -1|awk '{print $9}' # goes inside the first directory in the current directory
```

Other open-ended bonus options:

- a. [3 pts] Command history (pressing Up/Down button gives you the previous/next command)
- b. [3 pts] Autocomplete
- c. ...