Linux Essentials
(Exercises)

Getting Help:

1. Get help on how to use the 'echo' command
   man echo / info echo
2. Get a detailed description of the 'ls' command
   man ls / info ls
3. In one line, get a description of the 'ls' command
   whatis ls
4. Get help information about the 'df' command and scroll through it, up or down, at will
   info df
5. Display examples of how to use the 'sort' command.
   info sort
6. Using the information from the previous command, sort the output from 'compgen -c' in reverse order.
   compgen -c | sort -r

Managing Files and Folders:

1. Create two directories in your home directory named 'tmp1' and 'tmp2'
   cd ; mkdir tmp1 tmp2
2. Move to the tmp1 directory and create an empty file named 'test1'
   cd tmp1 ; touch test1
3. Without using an editor, add the statement, 'This is a test', three times to the file
   echo "This is a test" >> test1 ; echo "This is a test" >> test1 ; echo "This is a test" >> test1
4. Copy the 'test1' file to 'test1.backup' in the same directory
   cp test1 test1.backup
5. Copy the contents of the .bashrc file in your home directory to 'test1', without overwriting the previous content
   cat ~/.bashrc >> test1
6. Copy all lines in 'test1' that have the word 'alias' to a new file in the 'tmp1' directory called 'test2'
   cat test1 | grep -i "alias" > test2
7. Copy the file 'test2' to 'test3' in the same directory
   cp test2 test3
8. Copy the last ten (10) lines of 'test1' to 'file1'
   tail -n 10 test1 > file1
9. Copy the first three lines of 'test2' to 'file2'
   head -n 3 test2 > file2
10. Copy 'file1' and 'file2' to the 'tmp2' directory
    cp file* ../tmp2
11. Delete the original 'file1' and 'file2' files from 'tmp1'
    rm file1 file2
12. Modify the permissions for 'file1' and 'file2' in the 'tmp2' directory so they cannot be modified without root
    chmod -w ../tmp2/file*
13. Create a hard link between 'test3' in the 'tmp1' folder and a new file in the 'tmp2' folder with the same name
    ln test3 ../tmp2/test3
14. Add the line 'This is another test' to 'test3' in 'tmp1' and verify that the linked file in 'tmp2' is updated
    echo "This is another test" >> test3 ; cat ../tmp2/test3

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15. Display the last 3 lines in 'test3'
    tail -n 3 test3
16. Compress and archive all files in your home directory to ~/backup.tar.gz, if the name begins with 'test'
    find ~ -type f -name "test*" | tar -czvf ~/backup.tar.gz -T -
17. Verify the contents of backup.tar.gz without extracting the files
    tar -ztvf ~/backup.tar.gz
18. Copy all files in 'tmp1' to 'tmp2' if the name includes the word 'backup'
    find . -type f -name "*backup*" -exec cp {} ../tmp2 \;
19. Change your current working directory to the root folder (/)
    cd /
20. Do a search for all files in your home directory with names that include the word 'test'
    find ~ -type f -name "*test*"
21. From your home directory, create a new file ('findtest') that includes the command from the previous step
    echo "find ~ -type f -name '*test*'" > ~/findtest
22. Make the new file from the previous step executable and test it
    chmod +x ~/findtest ; ~/findtest

System & Process Management:

1. List all processes running on the computer by all users
   ps aux
2. List processes in real time. Sort them in descending order by the amount of memory being used
   top (Use Shift + F to modify field settings)
3. Display the kernel and operating system version information
   uname -a
4. Show all active connections to the computer
   w
5. Find out how long the system has been running
   uptime
6. Run the 'cat' command in the background
   cat &
7. Identify its process number and kill it
   ps > kill -9 <PID>
8. Open a web browser and terminate it using its process name
   killall -9 <browser name>
9. Display the sentence, 'This is a test', on the screen using a variable
   variable1="This is a test" & echo $variable1
10. Create a new file named 'test.txt' which has the line, 'This is a test'
    echo "This is a test" > test.txt
11. List all files in the current directory and show the contents of the 'test.txt' file, using a single statement
    ls ; cat test.txt
12. Display a list of all commands you have run in the current session
    history

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Managing Applications:

1. Update and upgrade the application packages on your system
   sudo apt update -y && sudo apt upgrade -y
2. List all packages installed on the system
   apt list --installed
3. Remove unnecessary library dependencies from the system
   apt autoremove --purge
4. Install Apache web server on your system
   apt-get install apache2
5. Verify that the service is set to auto-start and verify that it is running
   systemctl enable apache2 ; systemctl status apache2
6. Test connectivity to the default website
   In a web browser on the computer, go to http://127.0.0.1
7. Using the configuration files in /etc/apache2, locate the website files
   ls -la /etc/apache2/sites-available/*.conf
8. Locate the DocumentRoot folder and modify the default website page with one that you create yourself
   cp /var/www/html/index.html index.html.backup ; cp <my file> /var/www/html/index/html
9. Test connectivity to the new website page
   Open page in web browser
10. Disable the apache2 service
    systemctl disable apache2
11. Create a user account named student2 and make sure it has a home folder and uses the bash shell
    useradd -m -s /bin/bash student2
12. Assign a password of 'Password1' to student2
    passwd student2
13. Test the login account of student2 and verify the home directory and shell settings
    su – student2
14. Attempt to elevate student2 to super user to verify the account does not have those privileges
    sudo su
15. Logout student2 to return to your original account
    exit
16. Run visudo to give student2 root privileges
    visudo
17. Visudo opens /etc/sudoers file. Find the line for root. Add an identical line for student2. Save & exit
    student2 ALL=(ALL:ALL) ALL (Note: never try to save the file if there are any errors detected in it)
18. Login as student2
    su – student2
19. Verify that student2 is now able to use super user privileges
    sudo su

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Networking:

1. Run a command that displays the IP configuration of the local computer
   ip address show <network device> | grep inet
2. Run a command that displays only your public Internet IP address
   curl ipinfo.io
3. Create aliases for each of the first two commands and test them
   alias ip="ip address show | grep inet" ; alias iip="curl -s 'ipinfo.io' | jq -r .ip"
4. Verify Internet connectivity between your computer and github.com
   ping github.com -c4
5. Save the IP address of github.com to a new file named /tmp/github.ip
   ping github.com -c1 | grep icmp > /tmp/github.ip
6. List the IP routers between your computer and github.com
   mtr github.com
7. Create a secure shell connection to your computer and establish super user credentials
   ssh localhost
8. Add the IP address 8.8.8.8 as one of your DNS servers (**Note**: Always backup config files before modification)
   echo "nameserver 8.8.8.8" >> /etc/resolv.conf
9. Configure name resolution so that your first name can be used as your computer name
   Modify /etc/hosts file localhost information: **127.0.0.1 localhost <first name>**
10. Create a list of all open port numbers on your computer and put them in a file named /tmp/openports
    netstat -tulpn > /tmp/openports
11. For each open port number below 100, find the name of the service it is used for
    cat /etc/services | grep "22/tcp"
12. In the /etc directory, review the content of the 'hosts' file, then rename it to 'hosts.old'
    cp hosts hosts.old
13. Download the 'hosts' file from https://github.com/StevenBlack/hosts/blob/master/hosts using the path http://raw.githubusercontent.com/StevenBlack/hosts/master/hosts
    wget http://raw.githubusercontent.com/StevenBlack/hosts/master/hosts
14. Review the content of the new 'hosts' file
    cat hosts
15. Verify you still have Internet connectivity by using a web browser to connect to a website
    (Open Firefox or another browser)
16. Close the secure shell connection and verify you are in your previous session
    exit
17. Download the 'Linux_Command_Reference.pdf' file to your home directory from
    https://github.com/neiltucker/linux_essentials/blob/main/Linux_Command_Reference.pdf
    wget http://raw.githubusercontent.com/neiltucker/linux_essentials/main/Linux_Command_Reference.pdf
18. Verify the file downloaded successfully and you can view it from the GUI
    (Open the file with Document Viewer, Chrome or another PDF reader)