



Instructions: Legibly write your name in the top right corner of this page. This is an open book, open note, and closed neighbor, closed computer exam. This exam is timed. You have until 9:50 a.m. to finish, at which time all remaining exams will be collected. There are 100 points possible on this exam. For multiple choice questions, circle the correct answer (or answers). For true/false questions, circle either T or F as appropriate. For fill in the blank questions, write the appropriate words in the blanks provided to correctly complete the sentence. For short-answer questions, two or three sentences should be sufficient for each.

**True/False Questions are worth one-point each:**

1. (T/F) A shell script might be a simple list of commands, or it might be a complex list of commands implementing some algorithm.
2. (T/F) In addition to environment variables and user-created variables, shell scripts may use positional parameters, which are used by the shell to store the values of command-line arguments.
3. (T/F) TERM is an example of a user-created variable as opposed to PATH, which is an environment variable.
4. (T/F) C++ is an example of an interpreted language.
5. (T/F) Compiled languages produce programs that are machine-dependent.
6. (T/F) Interpreted languages produce programs that are machine-independent.
7. (T/F) The output of the Java "compiler" is Java bytecode, which is machine-independent object code saved in a Java class file.
8. (T/F) The ForTran language was one of the first high-level languages invented.  
*Formula translation*
9. (T/F) Programmers of very early computers translated algorithms to machine language by hand.
10. (T/F) The first general purpose computer was invented at the University of Pennsylvania by John Mauchley.
11. (T/F) The login initialization file sets the values of variables used by the shell.
12. (T/F) A shell script might be a simple list of commands, or it might be a complex list of commands implementing some algorithm.
13. (T/F) In addition to environment variables and user-created variables, shell scripts may use positional parameters, which are used by the shell to store the values of command-line arguments.
14. (T/F) The UNIX make utility is especially useful in larger software projects, and particularly those involving several teams of programmers or individuals.

15. ~~(T/F)~~ The UNIX make utility recompiles everything everytime, so the user doesn't have to remember a long command to do it.

**Multiple choice questions are worth four points each:**

16. For the Bourne Shell (sh) or the Bourne Again Shell (bash), which of the following is the name of the *login initialization file*?

- a. .profile
- b. .login
- c. .shrc
- d. .history

17. Which one or ones of the following are types of variables commonly used by the shell?

- a. Independent variables
- b. Dependent variables
- c. Environment variables
- d. User-created variables

18. If you want subshells to get the value of a user-created variable, which of the following commands is used?

- a. grep
- b. awk
- c. export
- d. sed

19. To list the values of all environment and user-created variables, which of the following commands is used?

- a. ls -a
- b. set
- c. grep -f environment
- d. vi variables

20. To view the value of the environment variable PS1, which of the following commands is used?

- a. more PS1
- b. ls PS1
- c. ls \$PS1
- d. echo \$PS1

21. "Syntax" refers to which of the following?
- a. A tax on alcohol, tobacco, or other products which some bureaucrat has decided are "unhealthy".
  - b. The rules of the language; such as the grammar rules of English.
  - c. Translating from one language to another.
  - d. What we mean when we use words.
22. "Semantics" refers to which of the following?
- a. Translating from one language to another.
  - b. The rules of the language; such as the grammar rules of English.
  - 2  c. What we mean when we use words.
  - d. The islands just off the western coast of Kyrgyzstan; also known as the Semantic Islands.
23. Which of the following best describes command-line arguments?
- a. A disagreement between a boss and subordinate in the command line of authority.
  - b. Anything following the command name on the command line, including options and filenames.
  - c. The actual values supplied to parameters in a function call.
  - d. The result of using commands in one shell which are only available in another shell.
24. The shell is actually a sophisticated programming language, including which one or ones of the following features found in other programming languages?
- a. Variables
  - b. Input/output functions
  - c. Arithmetic operations and conditional expressions
  - d. Structures for repetition and selection .
25. Which of the following commands would you use to compile and link a program named `LotsOFun.cpp`, producing a program file named `a.out`?
- a. `g++ lotsofun.cpp`
  - b. `g++ -c LotsOFun.cpp`
  - c. `g++ -o LotsOFun.cpp`
  - d. `g++ LotsOFun.cpp`
26. Once a `makefile` has been set up, which of the following commands will recompile multiple source code files into multiple object code files, and link multiple object files into a single executable program file?
- a. `emacs -o myprogram -c s1.cpp s2.o s3.o`
  - b. `make`
  - 2  c. `g++ myprogram.cpp`
  - d. `emacs Makefile`

27. Which of the following is the best definition of an algorithm?

- a. A set of steps defining how a task is performed.
- b. An ordered set of unambiguous, executable steps, defining a terminating process.
- c. A set of instructions for changing a tire.
- d. A new dance step.

28. Which of the following commands would you use to get input from the user?

- 1
- a. echo
  - b. set
  - c. expr
  - d. read

29. Which of the following best describes what the statement, `set `date`` will do?

- 2
- a. Sets the system clock to Coordinated Universal Time.
  - b. Execute the date command, setting the positional parameters \$1 through \$6 to the respective parts of the output of the date command.
  - c. Enters an interactive dialog to set the system clock to the correct date and time.
  - d. This statement is an error because it is supposed to use double quotation marks instead of backquotes.

30. What does the she-bang line (#!) do in a shell script?

- a. Specifies the shell to use to execute commands in the script file.
- b. Specifies which programming language is being used so the compiler will correctly interpret the syntax.
- c. Specifies the absolute pathname of the home directory of the system administrator.
- d. Specifies the file permissions on any new files created in the script file.

**Short-answer questions are worth five points each:**

31. Given the following makefile, suppose that only the file `line.h` has been modified since `make` was last run. Indicate which action lines in the makefile will be executed by the `make` utility, using default command line parameters.

```
# makefile for lineprog
```

X

```
lineprog: main.o line.o point.o
        g++ -o lineprog main.o line.o point.o
```

X

```
main.o: main.cpp line.h point.h
        g++ -c main.cpp
```

-1

X

```
line.o: line.cpp line.h
        g++ -c line.cpp
```

```
point.o: point.cpp point.h
        g++ -c point.cpp
```

32. In the space below, list any five of the common environment variables:

HOME, PATH, TERM, USER, PWD

33. List five common general features of programming languages.

~~Variables~~, ~~Input/output~~, ~~Functions~~, Arithmetic operations, conditional expressions

34. Within a shell script, what does "\$#" refer to?

Selection structures

the number of arguments

35. What should be the absolute minimum documentation in any program or script file?

name, date, and the function