UNIX SYSTEM PROGRAMMING FINAL EXAM

Spring 2014

The following assumptions can be made throughout the exam:
-- The shell is always tcsh.
- Anything used as a script has already been chmod-ed and is executable.
- Whenever the contents of a file are shown, there are no spaces at the ends of the lines.
- No files contain any characters other than those that can be directly typed on the keyboard -- for example, you can type "a" or "4" or "*" because these are all on the keyboard (and so is "\n"), but you cannot type "\r", so it is not in any of the files.

In this exam, you are in a certain directory and you discover these things:

```
% ls c*
cat
% ls d*
d  dog  dpfile  dzz
% ls f*
f1  f2  f3  f4
% cat f1
   a b c?
wio? 5?

1 0 2 0 3?
% cat f2
-e d
% cat f3 | wc -c
20
% cat dog
cat mouse
%
```

For each of the questions below, choose ONE of the choices from the list below. If two choices are possible, choose the alphabetically earlier letter.
For example:

Q: head -0 f1
A: E

Q: cat f1
A: K (Because we know its contents, as shown above)

Q: cat f4
A: M (Because we do not know its contents, as it is not shown above)

Q: ls f4
A: K (Because we do know that it exists -- even though we do not know its
contents -- as its existence information is shown above)

Q: cat z
A: B (Because we do not know if it exists, as it is not shown above)

Q: echo "j"; cat z
A: B (Note here that "K" also applies, but is not the answer.)

Q: echo 0
A: G (Note here that "I" and "K" also apply, but are not the answer.)

Here are the choices:

A) always produces an error.
B) might produce an error, depending upon the contents of the current directory.
C) might produce an error, depending upon what variables are defined.
D) hangs, waiting for the user to type more.
E) there is no output (not even an empty line).
F) there is definitely output, but it is only empty lines or spaces or tabs. (In other words, you don't SEE any output, except blank lines.)
G) the output is always and only the number "0" (or an equivalent number, such as "00.000"). No additional lines are allowed, even if they are blank.
H) the output is always and only the number "1" (or an equivalent number, such as "001.0"). No additional lines are allowed, even if they are blank.
I) the output is a number.
K) there is a predictable output.
M) there can be an output, but that output cannot be predicted.

So, now, here are the questions:

1. cat f3 | sed 's/./x/;d'
2. cat f3 | sed -n ':s;s/.//p;ts'
3. cat f3 | sed 's/./ /g'
4. cat f3 | sed 's:.::g'

5. cat f3 | sed 's/.*/&/'
6. cat f3 | sed -n "$p"
7. cat f3 | sed 1p
8. wc f1
9. cat f1 | grep ^$
10. cat f1 | grep "^$"
11. cat f1 | grep '^$'
12. cat f1 | grep '^.$'
13. grep " " f1
14. grep "'"'"' f3   (that is, if spaces were added: " ' " ' " ')
15. grep -e x
16. grep d??
17. grep "**" f1
18. grep -w w f1
19. grep -i i f1
20. grep -o o f1
21. grep -wio o f1
22. grep -B B f1
23. grep . f1
24. grep . f2
25. grep -v "?" f1
26. head -n 2
27. c??
28. ls c*
29. ls [cd]*
30. ls "[cd]*"
31. ?
32. *
33. "*"
34. ./*
35. %
36. ./""
37. ./*
38. cat
39. echo
40. echo ""''""
41. echo "\"
42. echo "\\"
43. echo "\\\"
44. echo \
45. echo \\
46. echo \\\

```
47. echo \\\\
48. echo \\\\\
49. echo "$<"
50. echo -n ""
51. cat f1 | tee Q
52. cat f3 | sed Q
53. cat f3 | sed G
54. cat f3 | sed g
55. cat f1 | sed Q
56. cat f1 | sed G
57. cat f1 | sed g
58. cat f1 | tr -d "[^0]"
59. cat f3 | awk '{for(i=1;i<NF;i++)$i="";print}'
60. cat f1 | awk '$1{print $2}'
61. cat f1 | awk 'NR!=3{for(i=1;i<NF;i++)$i="";print}'
62. cat f1 | awk '1;NR!=3{for(i=1;i<NF;i++)$i="";print}'
63. cat f1 | awk '{for(i=1;i<BEGIN;i++)$i=""}1'
64. cat f3 | tr -dc " " "\n"
65. head -1 f1 | cut -c1
66. head -1 f1 | cut -d " " -f 1
67. cat f1 | awk '{NF<0(print)}'
68. cat f1 | awk 'NF<0'
69. cat f1 | awk 'NF>0'
70. cat f1 | awk 'BEGIN{print}'
71. cat f1 | awk 'BEGIN{print 0+x}'
72. cat f3 | awk 0
73. cat f3 | sed 0
74. cat f3 | awk 1 | wc -l | xargs expr -1 +
75. cat f3 | sed 1 | wc -l | xargs expr -1 +
76. expr 1-1
77. expr 12 * 12
78. cat f1 | tr -dc "[0-9]"
79. cat f1 | awk '{print $0}{print}'
80. cat f1 | awk -F"'{print $0}{print}'
81. cat f1 | awk -F ".*" 1
82. cat f1 | awk -F ".*" '{$1=$1}1'
83. cat f1 | awk -F ".+" '{$1=$1}1'
84. cat f1 | awk '{FS=".*";print}'
85. cat f1 | awk '{FS=".*"}{$1=$1}1'
86. cat f1 | awk '{FS=".+"}{$1=$1}1'
87. cat f1 | sed -n 's/^\(.*\)\/\/\(.*\)/\1\#\2/p'
88. echo $#z
```

```
89. if (`cat f2`) echo $?
90. if (`cat f2`) then echo $?
91. if (`cat f2`) echo $?x
92. if (`cat f2`) then echo $?x
93. grep `cat f2`
94. grep `cat dog`
95. grep `cat dog` -e dog
96. `cat dog`
97. cat f1 | sed -n 's/^\(00*\)\(.*\)[0-9]\1/\2/p'
98. head -1 f3 | sed x
99. tail -1 f3 | sed n
100.cat f3 | sed ':a;N;$bb;ba;s/.//g'
101.head -2 f1 | sed N | wc -l
102.expr `head -2 f1 | sed N | wc -l` - 1
103.set x = ( `cat dog` ) ; echo $x[2]
104.set x = `wc -c f3` ; echo $x[2]
105.set x = `wc -c f3` ; echo '$x'
106.set x = `wc -c f3` ; echo $x
107.set x = `wc -c f3` ; echo $?x
108.cat f1 | grep "0*" | wc -l
109.cat f1 | egrep "0*" | wc -l
110.cat f1 | grep "0+" | wc -l
111.cat f1 | egrep "0+" | wc -l
112.cat f1 | grep "0*" | xargs wc -l
113.cat f1 | egrep "0*" | xargs wc -l
114.cat f1 | grep "0+" | xargs wc -l
115.cat f1 | egrep "0+" | xargs wc -l
116.cat f1 | sed -n '/0/s/[^0]//g;p"
117.cat f1 | sed -n '/0*/s/[^0]//g;p"
118.cat f1 | sed -n '/0+/s/[^0]//g;p"
119.cat f1 | sed -n '/0/{s/[^0]//g;p}"
120.cat f1 | sed -n '/0*/{s/[^0]//g;p}"
121.cat f1 | sed -n '/0+/{s/[^0]//g;p}"
122.cat f1 | sed -n '/0/s/[^0]//gp"
123.cat f1 | sed -n '/0*/s/[^0]//gp"
124.cat f1 | sed -n '/0+/s/[^0]//gp"
125.cat dog dog dog | awk '{L[$2]=$1}END{for (i in L) print i}' | wc -l
126.head -1 f1 | awk '{print NF % 2 }'
127.head -1 f1 | awk -F "" '{print NF % 2 }'
128.head -1 f1 | awk -F " " '{print NF % 2 }'
129.head -1 f1 | awk -F "[ ]" '{print NF % 2 }'
```