

Grade: 66/68 = 97%

Graded by Lawrence Jerome, 9/9/2004.

A great job on this assignment. Just missed one of the sequence problems. I've made my comments in blue, and points deducted in red.

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5.1 Evaluate the following:

a. $C(7, 2) = \frac{7!}{2!(7-2)!} = \frac{7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1}{2 \cdot 1 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1} = 7 \cdot 3 = 21$ [Correct.]

b. $C(12, 7) = \frac{12!}{7!(12-7)!} = \frac{12 \cdot 11 \cdot 10 \cdot 9 \cdot 8 \cdot 7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1}{7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1} = 11 \cdot 9 \cdot 8 = 792$

[Correct.]

c. $(x + y)^7 = x^7 + 7x^6y + 21x^5y^2 + 35x^4y^3 + 35x^3y^4 + 21x^2y^5 + 7xy^6 + y^7$

[Correct.]

d. the coefficient of $x^7 y^2$ in the expansion of $(2x - y)^9 = 4608$ [Correct:
Good job!]

5.2 How many words must be chosen in order to assure that at least two begin with the same letter? 27 words [Correct.]

5.3 How many different 4-digit numbers can be formed using 5, 6, 7, 8 without repetition? 24 different 4-digit numbers [Correct.]

5.4 How many distributions of 14 different books are possible if Carlos is to receive 5 books, Jamie, 4 books and Robert, 2 books?

$C(14,5) \cdot C(9,4) \cdot C(5,2) = 2,522,520$ [Correct: excellent job!]

5.5 Define probability. The ratio of what you want over the total of possibilities. It specifies what the chances are of something happening, such as having a one in six chance of rolling a three on a six sided die. [Correct.]

5.6 Determine the probability of the following:

a. If three dice are rolled, that all will be odd $\frac{1}{8}$ [Correct.]

b. If two coins are flipped, that they both will land the same $\frac{1}{2}$

[Correct.]

5.7 In a particular dormitory there are 350 college freshmen. Of these, 312 are taking an English course and 108 are taking a mathematics course. If 95 of these freshman are taking courses in both English and mathematics, how many are taking neither? $312 + 108 - 95 = 325$ students taking either math, English or both.

$350 - 325 = 25$ students taking neither math nor English [Correct: good analysis.]

6.1 In the following sequences determine s_5 if $s_0, s_1, \dots, s_n, \dots$ is a sequence satisfying the given recurrence relation and initial condition.

a. $s_n = -s_{n-1} - n^2$ for $n \geq 1$, $s_0 = 3$ $s_5 = -15$ [Incorrect: $s_5 = -18$. Partial deduction = 1 point.]

b. $s_n = 5s_{n-1} - 3s_{n-2}$ for $n \geq 2$, $s_0 = -1$, $s_1 = -2$ $s_5 = -124$ [this is s_4 . $s_5 = -533$. Partial deduction = 1 point.]

6.2 An investor begins to save in 1990 with \$500. Each year, the savings increases 10% over the year before, and then investor contributes another \$100. Write a recurrence relation and initial

conditions on the s_n , the amount of savings n years after 1990. Use this relation to determine the amount saved by 1994.

$$s_0 = 500$$

$$s_n = 1.1s_{n-1} + 100$$

$$(1994)s_4 = \$1196.15$$

[Correct.]

6.3 Explain the method of iteration. Computing successive numbers in a sequence starting with the initial value and then trying to guess the general formula by induction when a pattern exists. [Correct.]

6.4 Use the method of iteration to find a formula expressing s_n as a function of n for the given recurrence relation:

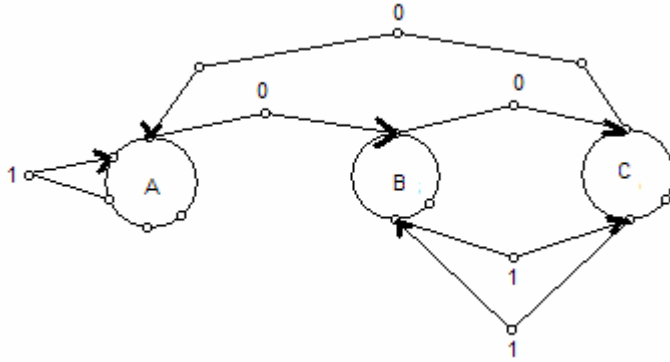
$$s_n = -s_{n-1} + 10, s_0 = -4$$

$$s_n = 5 - 9(-1)^n \quad \text{[Correct.]}$$

7.1 What are finite state machines? Is a computer a finite state machine? Explain. A finite machine is a machine that can change based on specific input, but is also dependent on past input values. Yes, a computer is a finite state machine because it has various outputs based on the inputs, but it also is dependent on previous inputs, such as how this computer interacts with this document is different depending on what my previous input was as well as my current input is. [Correct. Good example.]

7.2 Draw a transition diagram for the finite state machine with the given state table:

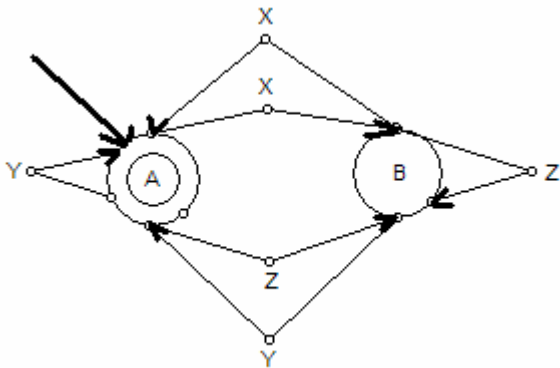
	A	B	C
0	B	C	A
1	A	C	B



My arrows are a little messy, but hopefully you can see which way they are pointing. A and B paths are on the inside and C paths are on the outside when they are double layered. [\[Correct: I can see!\]](#)

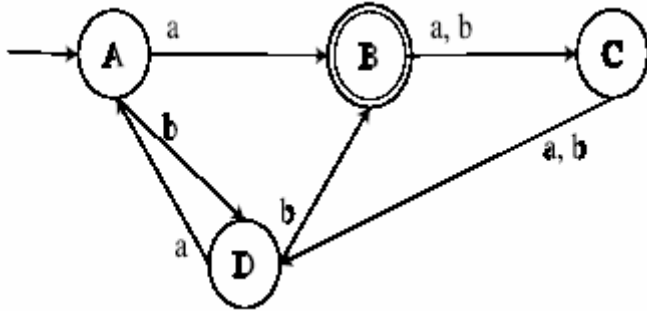
7.3 Draw a transition diagram for the finite state machine with the given state table below, with A being both the initial and accepting state.

	A	B
x	B	A
y	A	A
z	B	B



A paths are on the inside and B paths are on the outside where they are double layered. I hope this helps make it more clear where the arrows are. [\[Correct.\]](#)

7.4 Give the state table for the finite state machine with the given transition diagram:



$$s_0 = A$$

$$S' = \{B\}$$

	A	B	C	D
a	B	C	D	A
b	D	C	D	B

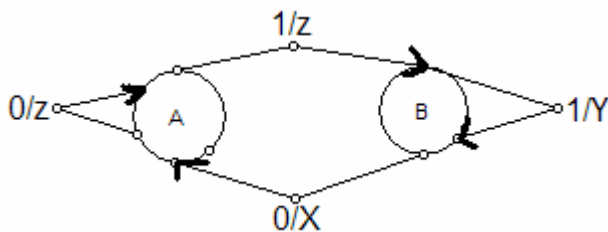
[Correct.]

7.5 In what state would the machine in the previous question end if it started in the initial state and was given the input string *abaabb*? B

[Correct.]

7.6 Draw the transition diagram for the finite state machine with output whose state and output tables is:

	A	B	A	B
0	A	A	z	X
1	B	B	z	Y



[Correct.]