

Trial Exam
Analysis 1-1920
Foundations of modeling

This exam consists of 40 Multiple-choice questions. For each question, only one answer is correct. Each question is worth one point. The cesuur is 26.5, which means that you need 27 points to pass.


Write your answers on the answer sheet provided!

1	An information-related activity such as answering the question “how to acquire information” is part of which information science segment?	
	A	information analysis
X	B	information collection
	C	information classification
	D	information storage

2	A photo editing tool such as Photoshop or Illustrator falls in which category:	
	A	hardware
	B	system software
	C	programming software
X	D	application software

3	Sequences of 1s and 0s are an example of a:	
	A	Analog signal
X	B	Digital signal
	C	Hexadecimal signal
	D	None of the above

4	Which of the following statements is FALSE ?	
	A	Every analog signal is degraded by noise.
X	B	Every digital signal is degraded by noise.
	C	Copying an analog signal degrades the quality.
	D	A copy of digital information is identical to its source.

5	A smooth and continuous signal (see image below) is: 	
	A	binary
	B	pulse
	C	digital
X	D	analog

6	Which of the following produce digital information?	
	A	Mercury thermometer
	B	VHS tape
X	C	DVD
	D	Sundial (<i>zonnewijzer</i>)

7	How can we represent an algorithm?	
	A	Algorithms can be expressed in natural language (less formal).
	B	Algorithms can be represented in pseudocode (more formal).
	C	Algorithms can be represented in flowcharts and block diagrams.
X	D	All of the above.

8	If A = 21 and B = 5, what is the value of variable C, after executing the following line in Python: <code>C = A // B</code>	
X	A	4
	B	4.20
	C	1
	D	None of the above

9	In which numeral system is the following calculation correct: $1 + 1 = 10$	
X	A	Binary system ($1_2 + 1_2 = 10_2$)
	B	Decimal system ($1_{10} + 1_{10} = 10_{10}$)
	C	Hexadecimal system ($1_{16} + 1_{16} = 10_{16}$)
	D	The calculation above is incorrect. $1 + 1 = 2$ in every numeral system.

10	The numeral systems invented and used in human history can be divided into:	
X	A	Non-positional and positional numeral systems.
	B	Binary and decimal numeral systems.
	C	Natural, rational and complex number systems.
	D	Decimal numeral systems that humans use and binary and hexadecimal used by machines.

11	A computer program is printing out numerical values in incremental order starting from 0. The printout gives the following: 0, 1, 10, 11, 100, 101, 110, 111, 1000, 1001, 1010, 1011, 1100, 1101, 1110, 1111 ... Based on the output you can conclude that the program is counting in which numeral system?	
X	A	Binary
	B	Octal
	C	Decimal
	D	Hexadecimal

12	Decimal numbers are base ...	
	A	2
	B	8
X	C	10
	D	16

13	Binary numbers are base ...	
	A	0 and 1
X	B	2
	C	10
	D	16

14	Which of the following is the correct sequence for the PLACE VALUES for BINARY numbers?	
	A	1, 2, 3, 4, 5, 6, 7, 8, 9
X	B	1, 2, 4, 8, 16, 32, 64, 128, 256
	C	0, 1
	D	1, 10, 11, 100, 101, 110, 111, 1000, 1001, 1010, 1011, 1100, 1101, 1110, 1111

15	Convert the hexadecimal number 2301_{16} to its binary equivalent:	
X	A	0010001100000001
	B	1111110011111110
	C	1111000011001010
	D	0000001111110000

16	What is a variable?	
	A	A variable is a label for a specific memory region where values are stored. The value stored in that region is constant during the execution of the program. A variable itself can never contain a value.
	B	A variable is the label for a specific memory region where values are stored. The value stored in that region can change during the execution of the program. A variable itself can never contain a value.
	C	A variable is a memory location in a computer that contains a certain value. The value stored in the variable is constant during the execution of the program.
X	D	A variable is a memory location in a computer that contains a certain value. The value stored in the variable can change during the execution of the program.

17	You want to write a program that will store a person's age. What is the most appropriate data type?	
X	A	integer
	B	string
	C	boolean
	D	set

18	What is the result of the following expression: (1234 // 10) % 10	
X	A	3
	B	4
	C	34
	D	123

19	Assume that variable A is assigned some value (e.g. A = 5). In the next step of the algorithm, the same variable is assigned a new value (e.g. A = 3). What happens with the previous value (5)?	
	A	This is not allowed! Python will report an error.
X	B	The old value (5) will be discarded and the new value (3) will be assigned.
	C	The old value (5) will be pushed onto stack. The variable will use the new value (3) until it gets deleted. Then, the old value (5) will be returned from the stack using POP instruction.
	D	The old value (5) will be printed onto standard output first. Then, the new value (3) will be assigned to the variable.

20	If you want to extract the second left digit from a variable N holding a four digit number, which formula can you use? (example: N = 1234 -> 2)	
X	A	$N \% 1000 // 100$
	B	$N \% 100 // 10$
	C	$N // 100 \% 100$
	D	$N // 10 \% 100$

21	Which Boolean logic operator should replace the '□' to get the following truth table?																
	<table border="1"> <thead> <tr> <th>P</th><th>Q</th><th>P □ Q</th></tr> </thead> <tbody> <tr> <td>TRUE</td><td>TRUE</td><td>FALSE</td></tr> <tr> <td>TRUE</td><td>FALSE</td><td>FALSE</td></tr> <tr> <td>FALSE</td><td>TRUE</td><td>FALSE</td></tr> <tr> <td>FALSE</td><td>FALSE</td><td>TRUE</td></tr> </tbody> </table>		P	Q	P □ Q	TRUE	TRUE	FALSE	TRUE	FALSE	FALSE	FALSE	TRUE	FALSE	FALSE	FALSE	TRUE
P	Q	P □ Q															
TRUE	TRUE	FALSE															
TRUE	FALSE	FALSE															
FALSE	TRUE	FALSE															
FALSE	FALSE	TRUE															
X	A	↓															
	B	→															
	C	↔															

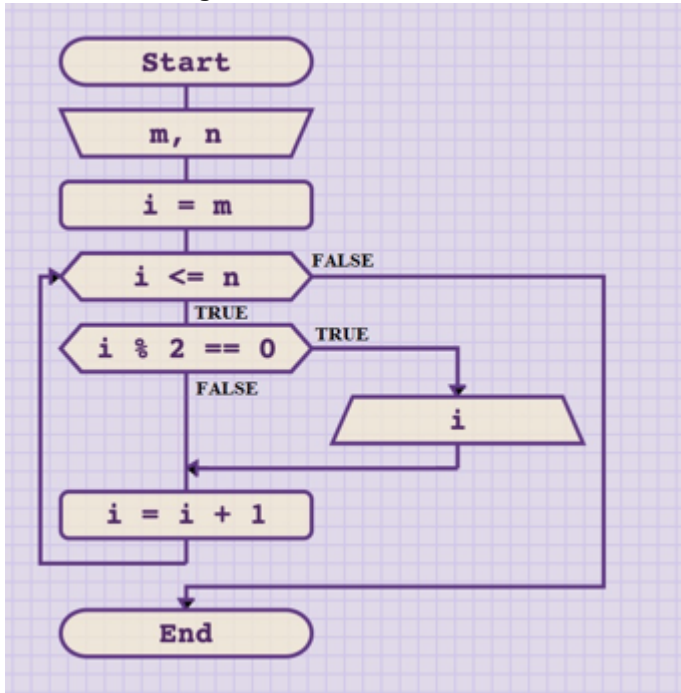
	D	\therefore
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22	Which are the fundamental logical operations?	
	A	logical implication (\rightarrow) logical equivalence (\leftrightarrow)
X	B	logical not (\neg) logical and (\wedge) logical or (\vee)
	C	logical or (\vee) logical nor (\downarrow) logical xor (∇)
	D	logical subset (\subset) logical superset (\supset) logical empty set (\emptyset)

23	What is the name for the following logical expression? $P \wedge \neg P$	
	A	This is a TAUTOLOGY (assertion that is True in every possible interpretation)
X	B	This is a CONTRADICTION (unsatisfiable statement that is False in every possible interpretation)
	C	This is a CONTINGENCY (formula that is neither Tautology or Contradiction; can be either True of False)
	D	None of the above.

24	After executing the following Python code, what will be the values of p and q? <pre>p = not True or True q = not (True or True)</pre>	
	A	p and q are both False.
	B	p is False and q is True.
X	C	p is True and q is False.
	D	p and q are both True.

25	Is it possible to implement WHILE loop as FOR loop and vice versa?	
	A	Every WHILE loop can be written as FOR loop, and also every FOR loop can be written as WHILE loop.
	B	Every WHILE loop can be written as FOR loop, but not all FOR loops can be written as WHILE loops.
X	C	Not all WHILE loops can be written as FOR loops, but every FOR loop can be written as WHILE loop.
	D	WHILE loop can never be written as FOR loop, and FOR loop can never be written as WHILE loop.

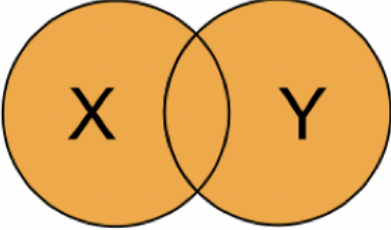
26	<p>What does this algorithm do?</p>  <pre> graph TD Start([Start]) --> Input[/m, n/] Input --> Assign[i = m] Assign --> Cond1{i <= n} Cond1 -- FALSE --> End([End]) Cond1 -- TRUE --> Cond2{i % 2 == 0} Cond2 -- TRUE --> Print[/i/] Print --> Inc[i = i + 1] Inc --> Cond1 Cond2 -- FALSE --> Inc </pre>	
	A	This algorithm prints out all even numbers from the interval (m,n)
X	B	This algorithm prints out all even numbers from the interval [m,n]
	C	This algorithm prints out all odd numbers from the interval (m,n)
	D	This algorithm prints out all odd numbers from the interval [m,n]

27	If you run the following command in IDLE what will be the output: tuple(range(10, 2, -2))	
	A	(2, 4, 6, 8, 10)
	B	(10, 9, 8, 7, 6, 5, 4, 3, 2)
	C	(10, 8, 6, 4, 2)
X	D	(10, 8, 6, 4)

28	You entered the following line in Python: S = "Hello world!". What do you get if you execute S[len(S)] in IDLE?	
	A	'H'
	B	'e'
	C	'!'
X	D	This will return IndexError: string index out of range

29	What are disjoint sets?	
	A	Two sets are disjoint sets if one set is entirely contained in another set, such that it cannot be separated (disjointed).
X	B	Two sets are disjoint sets if their intersection is the empty set.
	C	Two sets are disjoint sets if they intersect in the Venn diagram and share at least one member.
	D	Two sets are disjoint sets if one of the sets is the universal set.

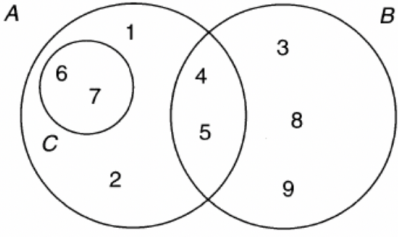
30	Are these two sets $A = \{1, 2, 2, 3\}$ and $B = \{3, 1, 2\}$ equal?	
	A	No, these sets are not equal. Equal sets must have the same cardinality. In this case $ A = 4$ and $ B = 3$.
	B	No, these sets are not equal because the order of the members doesn't match.
	C	No, these sets are not equal because both the cardinality of the sets and the order of their members do not match.
X	D	Yes, they are equal because they have the same members.

31	<p>You are given the following Boolean expression: $X \square Y$. Which Boolean operator needs to be written in place of \square to get the shaded area from the Venn diagram below:</p> 	
	A	AND
X	B	OR
	C	NOR
	D	NAND

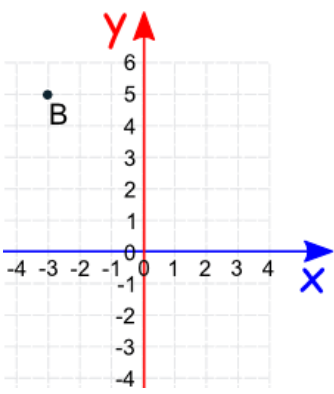
32	What is the proper notation to denote that set A is a proper superset of set B?	
	A	$A \subseteq B$
	B	$A \subset B$
	C	$A \supseteq B$
X	D	$A \supset B$

33	If $X = \{a, e, i, o, u\}$ and $Y = \{a, b, c, d, e\}$, then what is $Y - X$?	
	A	$\{a, e\}$
	B	$\{i, o, u\}$
X	C	$\{b, c, d\}$
	D	$\{b, c, d, i, o, u\}$

34	Let A be a set given by the following set-builder notation: $A = \{x \in \mathbb{N} \mid x < 3\}$ What is the value of $n(A)$?	
X	A	$n(A) = 2$
	B	$n(A) = 3$
	C	$n(A) = \{0, 1, 2\}$
	D	Cannot be determined as there is an infinite number of values that are lower than 3 (e.g. $\{2, 1, 0, -1, -2, -3, -4, -5, -6, \dots\}$)

35	Venn diagram below depicts three sets A, B and C and their elements.	
		
	What are the members of the set A^c ?	
	A	$A^c = \{6, 7\}$
	B	$A^c = \{4, 5\}$
	C	$A^c = \{1, 2, 4, 5\}$
X	D	$A^c = \{3, 8, 9\}$

36	Let $A = \{1, 2, 3, 4, 5\}$. How many subsets are there of A?	
	A	5
	B	10
	C	25
X	D	32

37	What are the Cartesian coordinates of the point B?	
		
	A	(5, -3)
	B	(3, -5)
	C	(-5, 3)
X	D	(-3, 5)

38	Assume A and B are two sets. Which proposition (written in Math notation) is True?	
X	A	$(A \subset B) \Rightarrow ((A \cap B) = A)$
	B	$A \times B = B \times A$
	C	$A - B = B - A$
	D	$A \subset (A \cap B)$

39	How many rows has a truth table for 5 boolean variables (excluding the header)?	
	A	5
	B	$5^{**}2$, that is 25
X	C	$2^{**}5$, that is 32
	D	$2^{**}(2^{**}5)$, that is 4294967296

40	Which expression is equal to the Cartesian product $\{1,2,3\} \times \{-1,0\}$?	
	A	$\{-1,-2,-3\}$
	B	$\{-3,-2,-1,0\}$
	C	$\{-1,0,1,2,3\}$
X	D	$\{(1,-1), (1,0), (2,-1), (2,0), (3,-1), (3,0)\}$