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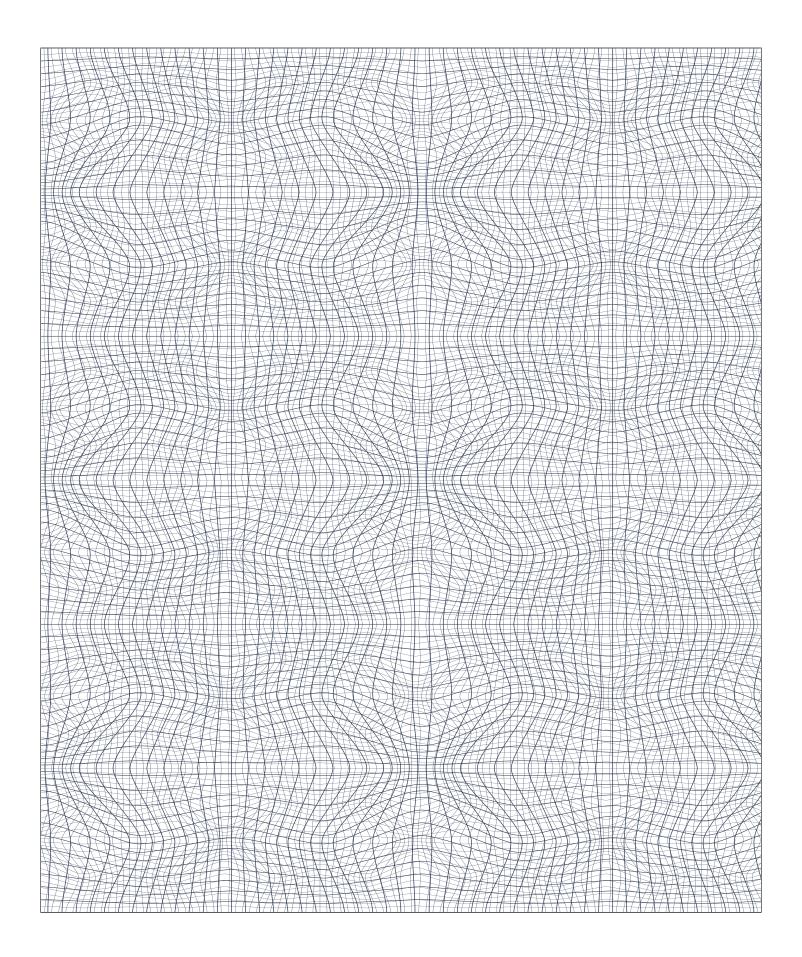
ENGI1020: Introductio	n to Programming
Mid-term test	
12 Feb 2020	

Name:		
Student ID:		

Instructions

- 1. Answer all questions.
- 2. Write your answers in the space provided on this paper.
- 3. Write your student number at the top of every answer page.
- 4. This is a closed-book exam: written aids are not permitted.
- 5. Calculators, phones and all other electronic aids are not permitted.
- 6. Unless otherwise specified, all code listed in this exam compiles and executes correctly.

Question:	1	2	3	4	5	Total
Points:	10	8	12	8	12	50
Score:						



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Student ID:		

Programming concepts

	Match the terms on the left natch each term (a through	to their definitions on the right. There are more definitions than terms: only j) once.	10
		Boolean value that determines which way control will flow	
		Combination of values and operators that can be evaluated	
	Decisions made as a program executes		
	a. algorithm	Grammatical rules of a language	
	b. commentc. condition	Ignored by the language; only for people	
	d. expression	Meaning	
	e. keyword f. literal	Name reserved by the language itself	
	g. operator	Place in memory to hold a value	
	h. syntax	Programmer-chosen name	
	i. type j. variable	Step-by-step procedure with decisions	
	,	Tells you a value's size, interpretation and operations	
		Value passed into a function	
		Value that means exactly what's written	
2. P	Programming types		[8]
-	(a) Cost of an airline ticket	complete sentences not required). There may be more than one correct answer.	1
((b) Prediction of how mucl		1
((c) The probability of a sno	owstorm tomorrow	1
((d) Your name		1
	(e) Whether or not you'll p	pass this exam	1
	(f) An analog sensor readir	ng from an Arduino	1
((g) A student's grade in a co	oure	1
((h) A compass direction		1

P

)	What will the following Python script print when it is run?
	print(type(1))
- 1	print(type(1 / 2))
- 1	print(type(1 % 2))
	print(type(1.0))
)	What will the following Python script print when it is run?
	x = 100
	y = 50
	z = x / y
	print(x, y, z)
	x -= 25
	if x % 10 == 0:
	z *= 2
	elif y > z:
	y /= 2
	print(x, y, z)
	x -= 25
	if x % 10 == 0:
	z *= 2
	elif y > z:
	y /= 2
	print(x, y, z)

[12] 4

8

2

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Program synthesis

4. The temperature sensor that we use in our labs in not a linear device. Rather, its resistance is given by the following equation:

$$R = R_0 \times e^B \times \left(\frac{1}{T} - \frac{1}{T_0}\right)$$

where B and R_0 are properties of the particular sensor being used. Substituting in the reference temperature T_0 and solving for T yields the following equations for temperature T (in Kelvin) and resistance R (in Ohms):

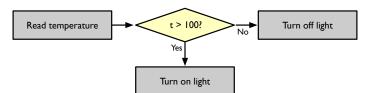
$$T = \frac{1}{B \log \frac{R}{R_0}} + \frac{1}{298.15} \qquad R = \frac{1023}{a} - 1 \tag{1}$$

where a is an analog reading from an appropriate Arduino port.

(a) Given variables a, B, R and R0, write a Python expression for the current temperature. You may use the log() function from the math module.

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(b) Assuming that you have an analog sensor connected to analog port 2 of your Arduino board and a light connected to digital port 4, write a Python script that corresponds to the following flowchart:



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5	White	a Python	corint	that x	· .: 11.
ο.	write a	a Pytnon	script	tnat v	VIII:

- 1. prompt the user for their year of birth
- 2. print out their age
- 3. print out the number of years until their next "decade" birthday (10, 20, 30, 40, etc.)

Workings (optional):

Answer:	