

NAME:

**Closed book. No calculators, no computer.  
Write all answers on these sheets. Do not ask questions!**

question	1	2	3	4	5	6	7	total
points								
maximum	10	15	15	15	20	15	10	100

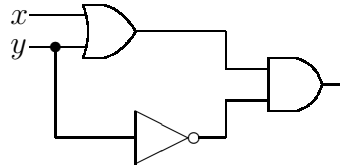
1. What is a compiler?

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2. View C2 as a number in the hexadecimal system. What is C2 in the decimal system?

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3. Consider the circuit drawn below:



- (a) For  $x = 0$  and  $y = 1$ , what is the outcome of this circuit?  
*Mark the results on the circuit drawing above.*
- (b) What is the logical expression that represents this circuit?

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4. Given a natural number  $t$  representing time in minutes.

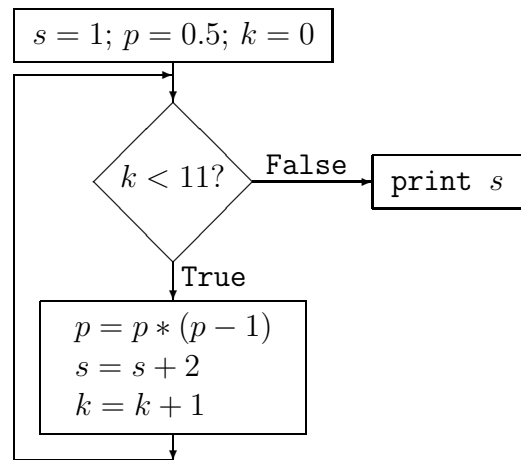
Write Python code to print the value of  $t$  in days, hours, and minutes.

The number representing the days, hours, and minutes is followed respectively by the characters **d**, **h**, and **m**.

For example:  $123 = 2\text{h } 3\text{m}$ ,  $23 = 23\text{m}$ ,  $1442 = 1\text{d } 2\text{m}$ .

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5. Consider the flowchart:



(a) What *expression* does the algorithm in the flowchart compute?  
(Do NOT evaluate the expression into one number.)

(b) Write Python code to implement the algorithm.

6. Given a vector with coordinates  $(v_1, v_2, v_3)$ , its product is  $v_1 \times v_2 \times v_3$ .

Write a Python *function* (call it `product`) which takes on input the coordinates of a vector and returns the product of the coordinates. Make sure the function also works for planar vectors, so the user can enter only two coordinates.

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7. Give the Python commands to generate a random 10-letter word.  
Use `random.randint()` to uniformly generate letters.  
The final result is a string of 10 characters.

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