Take-home assignment three

- Submit source codes (.py or .ipynb file) and a screenshot of the output. The source codes should be properly documented such that they are readable.

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1. Please write a guessing game program. The program randomly chooses an integer, *x*, in the range 1 . . . 1000, and then automatically guesses the value of *x*. For each incorrect guess, the computer only provides feedback whether the guess is too high or too low. Your program must find the value of *x* within 10 guesses (i.e., no more than 10 guesses). Please print how many guesses to find the value of *x*.

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2. Please write a function that takes an integer, *x*, as input, where $2 \leq x \leq 50$. The function splits *x* into *n* smaller positive integers such that (1) $n \geq 2$, (2) the sum of these *n* positive integers is equal to *x*, and (3) the product of these *n* integers is maximum. Please print the maximum product. For example,

- If *x=3*, the function should print 2, because 3 = 1 + 2, and 1 * 2 = 2.
- If *x=5*, the function should print 6, because 5 = 2 + 3, and 2 * 3 = 6.
- If *x=8*, the function should print 18, because 8 = 2 + 3 + 3, and 2 * 3 * 3 = 18.

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3. Please write a function that takes a string, *str*, as input/the parameter. The function needs to find a substring, *str2*, in *str* such that (1) *str2* does not have repeating characters, and (2) the length of *str2* is maximum. Please print the length of *str2*. For example,

- If *str='aaa'*, then the function should print 1, because *str2* would be *'a'*.
- If *str='asdfsab'*, then the function should print 5, because *str2* would be *'dfsab'*.