

COSC 120: HW#3
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1. **Palindrome Testing:** A palindrome is a word, phrase, number, or other sequence of characters which reads the same backward or forward, such as *radar* or *kayak*. Sentence-length palindromes may be written when allowances are made for adjustments to capital letters, punctuation, and word dividers, such as “Was it a car or a cat I saw?” or “No ‘x’ in Nixon”. Write a program that can tell if a word or sentence is a palindrome.
2. **Text Based Adventure game:** Expand the adventure game that you began in class to a minimum of 6 rooms with multiple outcomes per a room. Feel free to use anything we have covered up to this point in the course including graphics. This is an opportunity to fully showcase your creativity!
3. **Marble and Card Drawing:** If there are 200 marbles in a jar and 40 different types. What is the probability that you can choose 2 of the same type of marble in sequence without replacement? Can you create a simulation of this experiment in python? Can you do the same simulation for 2 card types chosen from a 52 card deck?
4. **A Falling Object:** An object falling vertically through the air is subjected to viscous resistance as well as to the force of gravity. Assume that an object with mass m is dropped from a height y_0 and that the height of the object after t seconds is:

$$y(t) = y_0 - \frac{mg}{k}t + \frac{m^2g}{k^2}(1 - e^{-kt/m})$$

where $g = 32.17 \text{ ft/s}^2$ and k represents the coefficient of air resistance in lb-s/ft. Suppose $y_0 = 300$ ft, $m = 0.25$ lb, and $k = 0.1$ lb-s/ft. Find, to within $1\text{E-}4$ (10^{-4} in python) second, the time it takes for this quarter-pounder McDonald’s cheeseburger to hit the ground using your bisection method from class. How many iterations did it take? What was the interval you used for time? What happens if you use Newton’s method?