

On my honor, as a University of Colorado at Boulder student, I have neither given nor received unauthorized assistance.

1.
 - a. Driving Directions: Input is the starting point and destination. Output is the series of roads, turns, and distances that would take one from the starting location to the destination. Factors such as shortest distance, shortest time, or cost may influence choice of final output.
 - b. Course Scheduling: Input is the name of the courses to be scheduled, as well as the number of students registered for each course. Output is the classroom and time that each course will be taught at.
 - c. Google Web Search: Input is the search terms specified by the user. Output is a list of web sites related to the provided search terms.
 - d. Amazon Item Recommendation: Input is the purchase history of the user. Output is a list of items that the user may be interested in purchasing.
 - e. FedEx Shipment Scheduling: Input is a list of packages to be delivered, including origin and destination, and delivery deadline. Output is a schedule of shipments and transfers, including origin, destination, and time, designed to move the packages from origin to destination in an efficient manner.
2. Recipe URL: <http://www.food.com/recipeprint.do?rid=28148> This recipe is slightly ambiguous. The ingredient list calls for 1 ½ cups cooked chicken, with no mention as to how it should be cooked, or what part of the chicken to use. It also calls for two green onions, chopped, with some tops. 'Some tops' is very vague. Last on the list are cheddar cheese, green onion, and picante sauce, for serving, with no mention as to amounts. Cooking directions are similarly vague, calling for "about ¼ cup" and "bake 25 minutes or until golden brown."
3.
 - a. $f = \Omega(g)$; n^7 will be larger than n^5 for all values where $n \geq 1$.
 - b. $f = \Theta(g)$; the two log terms will grow at similar rates, differing only by a constant.
 - c. $f = \Omega(g)$; f is exponential (3^n) while g is polynomial ($n^5 \log(n)$), so f will be larger than g as n increases.
 - d. $f = \Omega(g)$; f is exponential ($(5/3)^n$) while g is polynomial (n^8)
 - e. $f = O(g)$; f will be less than g as n increases. $((n-1)! < n!)$

4.

	$n = 10^3$	$n = 10^4$	$n = 10^5$	$n = 10^6$
Min runtime	0.01500010	2.03099989	235.07099986	
Max runtime	0.03100013	2.17199993	326.87599992	
average	0.02030000	2.13280000	298.32749996	29,990 *

Program runs in $O(n^2)$ time, as an increase of input size by a factor of 10 results in a runtime increase of approximately 100 times.

Program executed with Intel Core i5-4660, Windows 10, 16GB RAM.

* Extrapolated from previous data using Microsoft Excel trend line and corresponding equation, $y = 3 \cdot 10^{-8}x^2 - 0.0001x + 0.0943$; $R^2 = 1$.

