Instructions

This problem set is intended to solidify the concepts you learned about in this week's lectures and readings. Your responses will be worth 3% of your final grade. You are encouraged to work together with your classmates in small groups, and/or to post and answer questions on the course's Canvas site. However, ***you must clearly indicate who your collaborated with and submit your own (uniquely worded) responses***.

We will go over the answers to this problem set in class on **Monday January 25, 2016 at 1:45 pm**. You must upload your answers before then in order to receive credit. No late submissions will be accepted.

Readings

1. Please read Chapter 3 of *Foundations of Human Memory*. What were your thoughts on the reading? For example, did you learn something interesting? Were you surprised by something? Do you disagree with the author? Did you think some concept was described especially well (or confusingly)? **(Ungraded)**
2. Blei (2012) describes a "topic model," which is a computational algorithm that can mathematically discover and describe "topics" or "categories" by analyzing a large collection of documents. Read the paper (skimming or skipping the equations and the descriptions of "graphical models"). What did you think? **(Ungraded)**
3. Mitchell et al (2008) describes a technique for decoding which word someone is thinking of using their brain activity (recorded using a technique called functional magnetic resonance imaging, or fMRI). This technique allows researchers to obtain a 3D "snapshot" of someone's brain activity about once per second during an experiment. Read the paper (skimming the equations). What did you think? What are the ethical implications of this paper? **(Ungraded)**

Graded questions

1. After studying a list of 4 items during a trial of a Sternberg task, a participant's memory

$$M = \begin{pmatrix} 1 & 3 & 5 & 7 \\ 2 & 4 & 6 & 8 \\ 4 & 3 & 2 & 1 \\ 0 & 1 & 0 & 1 \\ 1 & 0 & 1 & 0 \end{pmatrix} = (\mathbf{m}_1\ \mathbf{m}_2\ \mathbf{m}_3\ \mathbf{m}_4)$$

matrix *M* is given by

Suppose the probe item is $\mathbf{m}_3$. Compute the summed similarity to Each item

2.