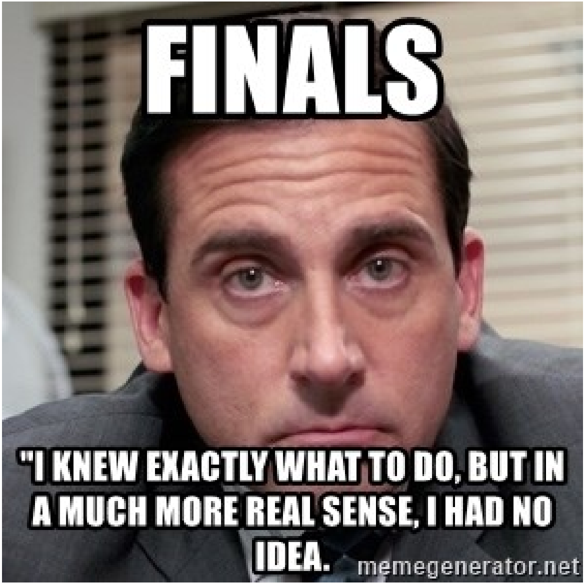
FINALS
"I KNEW EXACTLY WHAT TO DO, BUT IN
A MUCH MORE REAL SENSE, I HAD NO
IDEA.
memegenerator.net

Today's Agenda

Last time:

- Central Limit Theorem
- Moment generating functions

...we finished the course material!

Today (Lec 36, 07/26):

- Practice
- Course evaluation

Question 1

Suppose $X \sim \mathit{Bernoulli}(p)$ for some $p \in (0, 1)$. Compute the mgf of X and use it to compute $E(X)$ and $Var(X)$.

Question 2

Let X, Y be arbitrary random variables, which of the following is always correct?

- If X and Y are independent, they are uncorrelated.
- If X and Y are uncorrelated, they are independent.
- If X and Y are dependent, they are correlated.

Question 3

In a laboratory, the temperature of an object is measured independently with two thermometers A and B. Let X and Y show the temperatures of the object measured by thermometers A and B, respectively. We decide to combine the two measurements as a weighted average of X and Y to report the temperature of the object, i.e. the reported temperature T is $T = \alpha X + (1 - \alpha) Y$ where $\alpha \in (0, 1)$. For what value of α is the variance of the random variable T minimized?

Question 4

Let X be a continuous random variable with pdf

$$f(x) = e^{-x}, \quad x \geq 0$$

and 0 otherwise. Compute the median of X.

Question 5

It is known that 8% of the world's population has blue eyes. Suppose you would like to estimate this proportion by asking n people wether they have blue eyes. You would use as an estimate X/n where X is the number of people having blue eyes in a sample of n people. How many people do you need to ask so that with probability 95%, the estimate will be within 0.01 of its true value 0.08?

Question 6

Suppose that $X_1, ..., X_{50}$ are independent Geometric random variables with parameter 0.5. Estimate the probability that $\sum_{i=1}^{50} X_i > 55$.

Question 7

Let X be a continuous rv with pdf

$$f(x) = \lambda x^{\lambda-1}, \quad 0 < x < 1,$$

and 0 otherwise.

a) Compute $E(X^k)$ for $k \in \mathbb{N}$.
b) Let $Y = -\lambda \log(X)$. Determine the pdf of Y.

Course Perceptions

Please go to `https://perceptions.uwaterloo.ca` and fill out the survey.