Homework #05 • MATH495/STAT490 • More Conditioning

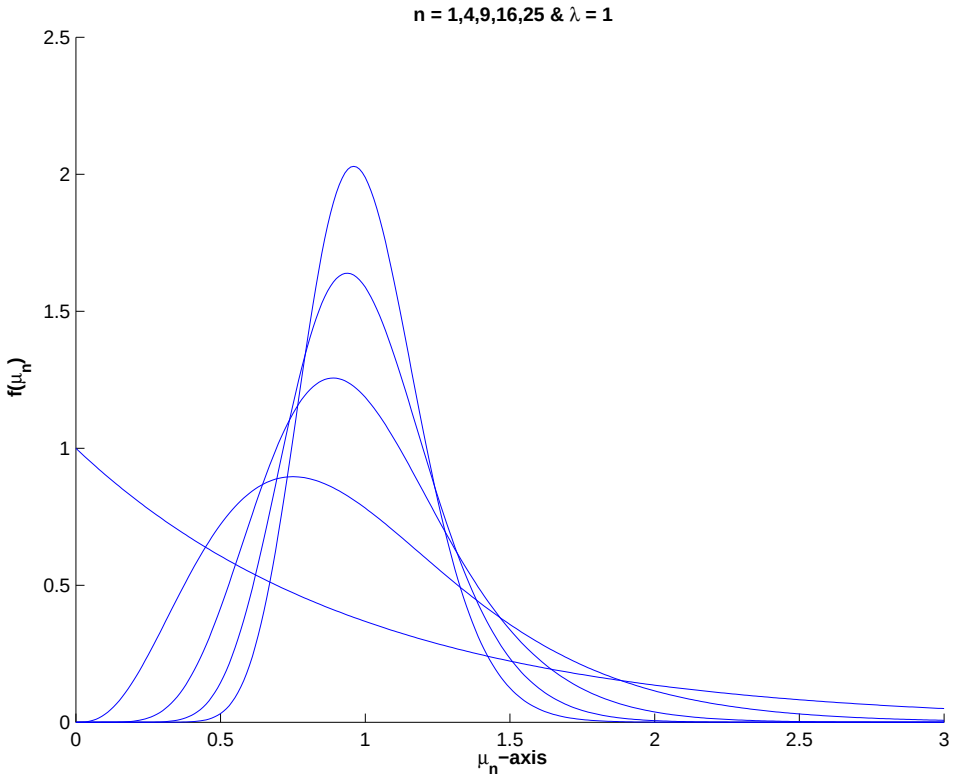
- submit your write-up before 12 noon on **Thursday** 16 October.
- page limits will be enforced.
- highlight major results.
- happy thanksgiving.
- **to aid the grader, please begin each lettered problem on a new page**.

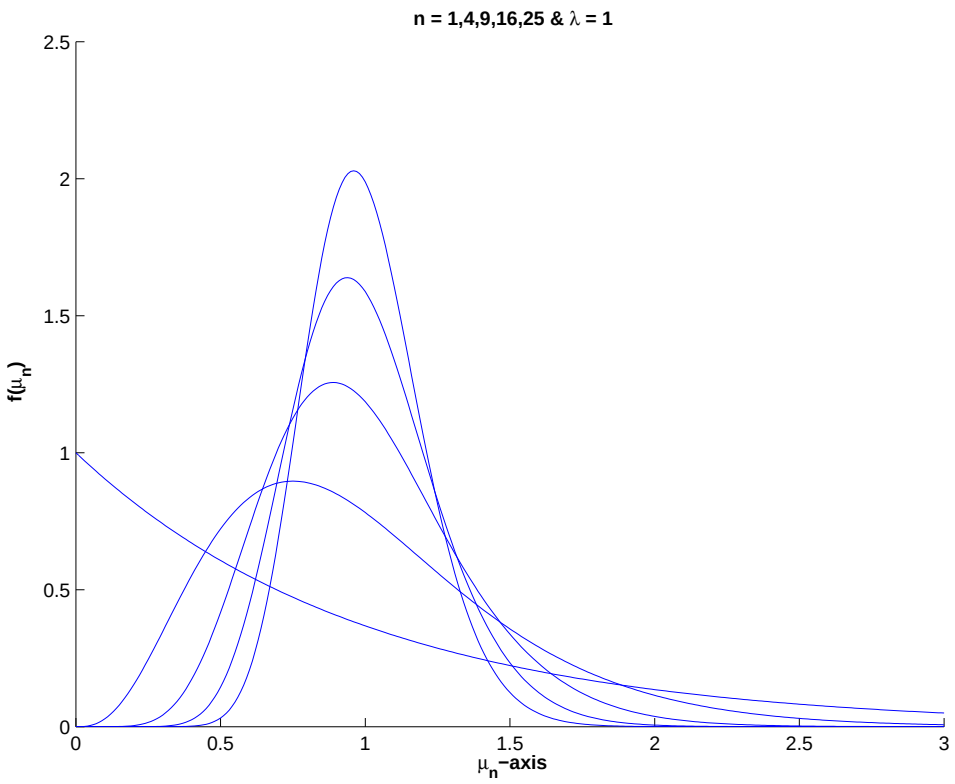
A) How to be Fashionably Late (2+2 pages, 10 pts) Problems # 42 & 55 from from Chapter 3 of Ross. Begin # 42 by stating the mean and variance of a Bernoulli random variable. Carry out #42 for an arbitrary number n invitees, then specialize your result to $n = 11$. # 55 can be worked as stated in the text. You encouraged to discuss conditioning strategies on the webct discussion group.

B) The Average of Exponential Random Variables (4 pages, 10 pts) This exercise investigates the random variables, S_n and μ_n, which are the sum and average of n exponentially-distributed random variables $\{x_1, x_2 \ldots x_n\}$ which have identical values of λ

- calculate the PDF, $f(S_2)$, by conditioning on x_2 (see also page 58);
- hypothesize the PDF for general n. You might need to obtain $f(S_3)$ to convince yourself you see the straightforward pattern;
- verify your PDF by induction (integrals are no worse than powers);
- determine the PDF for the average μ_n using the fact that,

  given a random variable x with PDF, $f(x)$, the random variable obtained by dividing by a constant $y = x/a$ has PDF $af(ay)$,
- annotate the attached and completely unannotated (so very irresponsible of me) figure.




n = 1,4,9,16,25 & λ = 1
2.5
2
1.5
1
0.5
0
f(μn)
0
0.5
1
1.5
2
2.5
3
μn−axis