

Homework 3, Stat 100a, due Wed Mar2, 2pm.

6.14, 7.2, 7.8. On 6.14, assume  $t < \lambda$ .

Submit as a pdf by email to STAT100AW22@stat.ucla.edu.

6.14 Show that the moment-generating function of an exponential ( $\lambda$ ) random variable is  $\phi_X(t) = \lambda/(\lambda - t)$ . Use this to show that  $E(X) = 1/\lambda$  and  $\text{var}(X) = 1/\lambda^2$ .

7.2 Suppose you are dealt a two-card hand of Texas Hold'em. Let  $X$  = the number of face cards in your hand and  $Y$  = the number of kings in your hand. (a) What is  $E(Y)$ ? (b) What is  $E[Y | X]$ ? (c) What is  $P\{E[Y | X] = 2/3\}$ ?

7.8 Daniel Negreanu lost approximately \$1.7 million in total over the first five seasons of *High Stakes Poker*. However, is he a losing player in this game, or is it plausible that he has just been unlucky and if he were to keep playing this game for a long time, could he be a long-term winner? (a) Find a 95% confidence interval for Negreanu's mean winnings per hand, assuming that his results on different hands are *iid* random variables, that he played about 250 hands per season, and that the *SD* of his winnings (or losses) per hand was approximately \$30,000. (b) If Negreanu were to keep losing at the same rate, how many more hands would we have to observe before the 95% confidence interval for Negreanu's mean winnings per hand would be entirely negative, i.e., would not contain 0?