

APMA 1650 Homework 5 Common Mistakes

Rebecca Santorella

1. No common mistakes.
2. No common mistakes.
3. Almost everyone was able to prove the $t > 0$ case. The main error on the $t < 0$ case was not recognizing that $P(X \leq a) = P(e^{tX} \geq e^{ta})$ since multiplying by a negative number flips the inequality.

A number of students also lost points for having extremely unclear proofs. You should use full sentences, justify steps (such as applying Markov's inequality), and clearly tell the reader what part of the proof you're working on. When moving from the $t > 0$ case to the $t < 0$ case, it should be clear what changes and how this affects the final answer.

4. Some students tried to use the binomial normal approximations. We don't know the distribution in question though, so the only appropriate approach is to use Chebyshev's inequality.
5. The best way to approach this problem is through induction. Again, proofs should tell the reader what is happening. State that you are using induction and justify any manipulations.

Many students also left out the base case for $\Gamma(1)$. Without this, we would only be able to expand to $\Gamma(k+1) = k(k-1)(k-2)\dots\Gamma(1)$.

6. (a) A lot of people forgot to show that $f(x) \geq 0$, but this is also a requirement for pdfs.
(b) The problem gives that $X_1 \sim \text{Uniform}([0, 1])$ and $X_2 \sim \text{Normal}(0, 1)$, so we know the values of μ_1, μ_2, σ_1 , and σ_2 . These values should be used in the final answer.