MATH 10B
Section 211
GSI: Theo McKenzie

Student:
SID:
Tue 4/30/19

Quiz 13 Solution

True/False - No explanation needed. (For each: 1 point if correct, 0 points if not answered, -1 points if incorrect)

1. The recurrence relationship $\Gamma(n) = (n-1)\Gamma(n-1)$ and the fact that $\int_0^\infty e^{-t}dt = 1$ implies that $\Gamma(n) = (n-1)!$ for all $n \geq 1$. True/False

   True. We can think about this inductively. The second property gives us $\Gamma(1) = \int_0^\infty e^{-t}dt = 1$ and the first implies that if this equality is true for n it is true for $n+1$.

2. In a t-distribution, the degrees of freedom ν are 1 fewer than the number of measurements $x_1, \ldots, x_n$ because, even though σ_0 may be unknown, it is fixed for X, thereby yielding a quadratic relation between the x_i's and the sample mean x. True/False

   False. This is the correct number of degrees of freedom, but not for the correct reason. For example, σ_0 is not fixed for x. Rather it depends on the random samples of X.

Problems - Needs justification.

1. I have a coin that I believe to be fair. If I flip it 20 times and get 15 heads, can I reject my null hypothesis with significance level $\alpha = .05$? Use a χ^2 statistic. (10 points)

   To compute our distance from the expected value, we have

   $$\frac{(15-10)^2}{10} + \frac{(5-10)^2}{10} = 5$$

   The χ^2 statistic is 3.84, so we reject the null hypothesis that this is a fair coin.