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May 12 2023

Stat 261 Assignment 0

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Due date: May 12, 2023, 11:59 pm

Answer the questions (handwritten on paper or on a tablet or computer file). Create a **PDF** file of your answers (scan handwritten notes or save tablet notes to pdf). Upload your **PDF** file to Brightspace.

NOTE: jpeg files are not acceptable.

For each of the following questions, indicate whether the statement is true or false and justify it. (4 points for each question)

1. $\frac{\sum_{i=1}^{n} a_i b_i}{\sum_{i=1}^{n} a_i^3} = \sum_{i=1}^{n} \frac{b_i}{a_i^2}$

   False: $\frac{\sum_{i=1}^{n} a_i b_i}{\sum_{i=1}^{n} a_i^3} = \frac{a_1 b_1 + \dots + a_n b_n}{a_1^3 + \dots + a_n^3} \langle \neq \rangle \sum_{i=1}^{n} \frac{b_i}{a_i^2}$

2. $\prod_{i=1}^{n} e^{2y_i} = e^{2\sum_{i=1}^{n} y_i}$

   True: $\prod_{i=1}^{n} e^{2y_i} = e^{2(y_1 + \dots + y_n)} \langle \Leftrightarrow \rangle e^{2\sum_{i=1}^{n} y_i}$

3. $\ln\left(\prod_{i=1}^{n} \lambda e^{\lambda x_i}\right) = n \ln \lambda + \lambda \sum_{i=1}^{n} x_i$

   True: $\ln\left(\prod_{i=1}^{n} \lambda e^{\lambda x_i}\right) = \ln\left(\left(\lambda e^{\lambda x_1}\right)(\dots)\left(\lambda e^{\lambda x_n}\right)\right)$

   $= n \ln \lambda + \lambda x_1 + \dots + \lambda x_n \langle = \rangle n \ln \lambda + \lambda \sum_{i=1}^{n} x_i$

4. $\sum_{i=1}^{n} 2(x_i + 1) = 2\left(\sum_{i=1}^{n} x_i\right) + n$

   False: $\sum_{i=1}^{n} 2(x_i + 1) = 2\sum_{i=1}^{n} x_i + 2\sum_{i=1}^{n} 1 = 2\left(\sum_{i=1}^{n} x_i\right) + 2n$

   $\langle \neq \rangle 2\left(\sum_{i=1}^{n} x_i\right) + n$

5. $\prod_{i=1}^{n} \rho^{x_i}(1-\rho)^{k-x_i} = \rho^{\sum_{i=1}^{n} x_i}(1-\rho)^{k-\sum_{i=1}^{n} x_i}$

   False: $\prod_{i=1}^{n} \rho^{x_i}(1-\rho)^{k-x_i} = \left(\rho^{x_1}(1-\rho)^{k-x_1}\right)(\dots)\left(\rho^{x_n}(1-\rho)^{k-x_n}\right)$

   $= \rho^{\sum_{i=1}^{n} x_i}(1-\rho)^{nk - \sum_{i=1}^{n} x_i}$

   $\langle \neq \rangle \rho^{\sum_{i=1}^{n} x_i}(1-\rho)^{k - \sum_{i=1}^{n} x_i}$