Name _____

Student Number _____

STA 312 f2023 Quiz 7

1. (4 points) Let the continuous random variable X have density $f_x(x) = \exp\{x - e^x\}$, for all real x. Find the density of $Y = e^X$. Show your work. Please be sure to specify where the density of Y is non-zero, and where it is zero.

2. (3 points) For the regression equation $y_i = \beta_0 + \beta_1 x_{i,1} + \beta_2 x_{i,2} + \beta_3 x_{i,3} + \epsilon_i$, the response variable y_i is the cumulative grade point average (GPA) of High School student i, $x_{i,1}$ is family income, $x_{i,2}$ is mother's education, and $x_{i,3}$ is father's education. Give the null hypothesis you would test to answer the following questions. A null hypothesis is a statement about the model parameters.

   (a) Once you correct for parents' education, is GPA still related to family income?

   (b) Allowing for family income, is GPA related to parents' education?

   (c) Once you control for family income and mother's education, is GPA related to father's education?

3. In Question 8 of Assignment 7, you analyzed data from a sample of pigs. Consider this question: Adjusting for mother's weight and father's weight, which drug helps the average pig gain more weight, Drug 1 or Drug 2?

   (a) (1/2 point) In the space below, write the F or t statistic, a number from your printout. On your printout, circle the number and write "Question 3a" beside it.

   (b) (1/2 point) In the space below, write the p-value, a number from your printout. On your printout, circle the number and write "Question 3b" beside it.

   (c) (2 points) In plain, non-statistical language, what do you conclude from this test? Your answer should be guided by the $\alpha = 0.05$ significance level, but you must not mention that, because this is a plain language answer. You cannot get any marks for this part unless the test statistic and p-value are correct.

Please attach the printout(s) with your answers to Question 8 of the assignment, showing all the input and output. **Make sure your name and student number are written on the printout**.