Please read the following instructions carefully:

- There are **two problems** in this quiz.
- The point distribution is given in the table below.
- Please write each solution on a seperate page.
- This is a group quiz. Feel free to discuss the problems with your teammates. **You must, however, write and turn in your own work.**
- Upload your work to Gradescope.

Question:	1	2	Total
Points:	5	5	10

1. Solve the following question:
   (a) (3 points) Find a so that
   $$f(x) = \frac{3x^2}{8}$$
   is a probability density function for $0 \leq x \leq a$.
   (b) (2 points) In a factory, the average time between accidents has a probability density functions
   $$f(t) = 0.1e^{-0.1t}, \qquad 0 \leq t < \infty$$
   What is the probability that the next accident happens between 5 and 10 days from now on. Your answer may contain exponentials.

2. Solve the following questions:
   (a) (3 points) Consider the function
   $$f(x, y) = 5x^3y^2 + e^x + \ln(y)$$
   Calculate $\frac{\partial f}{\partial x}$ and $\frac{\partial f}{\partial y}$ and $\frac{\partial^2 f}{\partial x \partial y}$.
   (b) (2 points) Let $f(x, y)$ is a function of x and y. Assume we know that
   $$f(100, 250) = 3, \qquad \frac{\partial f}{\partial x}(100, 250) = 7, \qquad \frac{\partial f}{\partial y}(100, 250) = -5.$$
   Estimate the value of $f(97, 250)$.