(1) This is a closed book, closed notes exam. Switch off your cell phone and do not communicate with anyone other than an exam proctor.

(2) Start writing when instructed. Stop writing when your time is up.

(3) Remember that your work is graded on the quality of your writing and explanation as well as the validity of the mathematics.

(1) (5 Points) Suppose we have two random variables $X$ and $Y$ with the following joint distribution:

\[
\begin{array}{c|ccc}
   & X = 1 & X = 2 & X = 3 \\
---&---&---&---
Y = 0 & 1/3 & 1/4 & 1/6 \\
Y = 1 & 1/12 & 1/12 & 1/12 \\
\end{array}
\]

Write down the conditional distribution of $X$ given $Y = 1$.

(2) (5 Points) Write down the derivative of the following function $f$, and state the values of $x$ for which $f$ is increasing:

\[ f(x) = 2x - e^{x-1} \]