2. An urn contains a total of $n = 125$ marbles: 93 black and 32 white. In an experiment, two marbles are to be randomly drawn, one at a time, without replacement, and their respective colors recorded.

(a) Draw a **tree diagram** for this experiment, clearly labeling all relevant **outcomes** and their corresponding **probabilities**. Then use it to answer the subsequent questions. **Show all work!**

(13 pts)

(b) Calculate the **probability** of the event E = "at least one marble is black." (2 pts)

(c) Calculate the **probability** of the event F = "at least one marble is white." (2 pts)

(d) Are the events E and F **statistically independent**? Formally justify your answer. (2 pts)

(e) Calculate the **probability** that both marbles are the same color. (2 pts)

(f) Calculate the **probability** that both marbles are black, *given* that both are the same color. (2 pts)

(g) Calculate the **probability** that both marbles are black, *given* that at least one of them is black. (2 pts)