The highway speeding problem

For a particular model of police speed gun, when measuring cars at the same highway speed the measured speeds are normally distributed with a standard deviation of 2.9 mph.

a. A cop pulls someone over after measuring their speed at 70 mph in a 65 mph zone.
The person was sure that both the speedometer and GPS were at 65 mph. What is the probability that the car was measured at 70 mph or greater if the car was actually going 65 mph?

b. You have been hired by a law firm as an expert statistical witness defending the driver. What would you say?

c. You have been hired by the district attorney as an expert statistical witness to prosecute the driver. What would you say?

d. Almost the same scenario as in (a), but everything is 5 mph faster.
A cop pulls someone over after measuring their speed at 75 mph in a 70 mph zone.
The person was sure that both the speedometer and GPS were at 70 mph. What is the probability that the car was measured at 75 mph or greater if the car was actually going 70 mph? Before you do any calculations, do you predict the probability will be higher, lower, or exactly the same. Support your answer.

e. Let’s approach the same problem from the minimum speed law.
A cop pulls someone over after measuring their speed at 35 mph in a zone where the minimum speed is 40 mph. The person was sure that both the speedometer and GPS were at 40 mph. What is the probability that the car was measured at 35 mph or slower if the car was actually going 40 mph? Before you do any calculations, do you predict the probability will be higher, lower, or exactly the same. Support your answer.