Problem 1 [15]. Widgets are manufactured in three factories: A B and C. The proportion of defective widgets from each factory are as follows:

Factory A: .01
Factory B: .04
Factory C: .02

Factories A and B produce 30% of the widgets apiece, and the remaining 40% come from Factory C.

What is the likelihood that a given widget is defective?

Solve graphically *and* with Bayes'. Put your numeric answer in the box and show your work below.

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Question adapted from study.com.

Problem 2 [20]. Suppose there are two full bowls of cookies. Bowl #1 has 10 chocolate chip and 30 plain cookies, while bowl #2 has 20 of each. Our friend Stacy picks a bowl at random, and then picks a cookie at random. We may assume there is no reason to believe Stacy treats one bowl differently from another, likewise for the cookies. The cookie turns out to be a plain one. How probable is it that Stacy picked it out of Bowl #1?

Solve graphically *and* with Bayes'. Put your numeric answer in the box and show your work below.

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Problem 3[15]. The blue M&M was introduced in 1995. Before then, the color mix in a bag of plain M&Ms was (30% Brown, 20% Yellow, 20% Red, 10% Green, 10% Orange, 10% Tan). Afterward it was (24% Blue, 20% Green, 16% Orange, 14% Yellow, 13% Red, 13% Brown).

A friend has two bags of M&Ms, and tells me that one is from 1994 and one from 1996. My friend won't tell me which is which, but gives me one M&M from each bag. One is yellow and one is green. What is the probability that the yellow M&M came from the 1994 bag?

Solve graphically *and* with Bayes'. Put your numeric answer in the box and show your work below.

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Thanks Allen Downey for these two, who also points out that these are "urn problems."