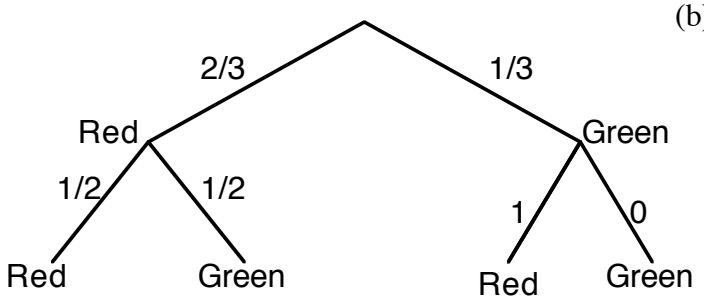
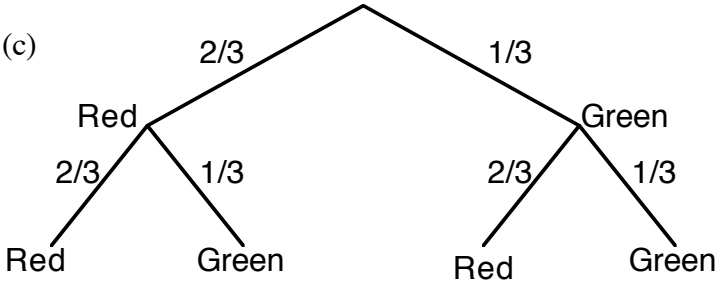
Practice Quiz 4 Solutions

[1] (a)



(b) P(Green) = (1/2)2/3 + (1)1/3 + (0)1/3 = 2/3

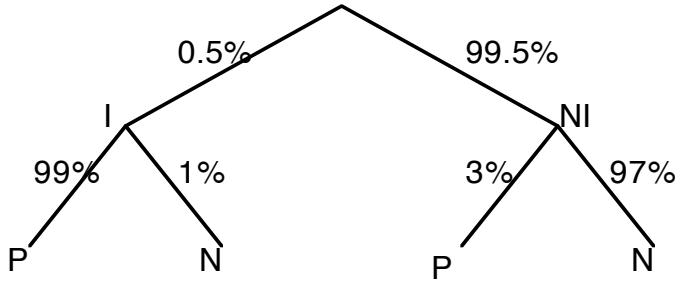
(c)



(d) P(Green) = (1/3)(2/3)+(1/3)(1/3)
= 3/9 = 1/3

[2] NI = Not Infected; I = Infected; P = Positive; N = Negative

(a)



(b) P(I) = 0.5%

(c) P(P|NI) = 3%

(d) P(NI|P) =

= .995(.03)/(.995(.03)+.99(.005)) =

= 85.78%

[3] (a) An ACT score of 29 is 9 points above the mean. Since σ is 6, this is 1.5σ. Since z is just the number of times σ that the score is above or below the mean, and since 29 is 1.5σ above the mean, we see z = 1.5. Note: when the score is below ther mean, z is negative. So an ACT of 17 gives z = -0.5.
(b) The proportion of test takers between the mean of 20 and 1.5σ is 43.32% according to the table. Since 50% are above the mean, there are 50-43.32 = 6.68% above 1.5σ.In other words, 6.68% receive scores of 29 or better.
(c) Note that to have 69.15% of test takers receive better scores than you, you're in the bottom half, so you must have gotten a score below the mean. Thus the percentage of test takers that got scores between your score and the mean of 20 is 69.15-50 = 19.15%. The table value for 0.1915 is z = 0.5; i.e., (1/2)σ below the mean, or 20 - (1/2)6 = 20 - 3 = 17. So you must have gotten a score of 17.

[4] Since n = 2104, and p = 0.45, we get $s = \sqrt{((.45)(.55)/2104)} = 0.0108$. A 95% confidence interval is just the interval ranging from 2s below p to 2s above p. I.e., the confidence interval is 0.45 ± .0216 or 42.84% to 47.16%.

[5] We must find the sample size n such that we get a value for s which gives us the desired accuracy of 1%; i.e., such that 2s = 0.01. But $s = \sqrt{(0.02)(0.98)/n}$, so we need $2\sqrt{(0.02)(0.98)/n} = 0.01$. We just need to solve this for n, either by guess and check or by algebra. Either way we get n = 784.

[NOTE: my word processor doesn't easily allow me to put accents above characters, but the p and s referred to in problems 4 and 5 are the sample p, and sample s or standard error. The correct way to write them is with a little wedge shape, known as a circumflex accent, above them.]