The Nose Knows

This Issue's Puzzle

Alaskan North American Eskimos are famous for their hospitality. Dalakaduk and his wife Manaluk invited five other Eskimos husband-wife couples over for a traditional "house warming" in their new igloo. These Eskimos followed their old tradition whereby, regardless of gender, two people would greet each another with a "kunik," that is by rubbing noses.

Spouses, of course, do not greet each other at such Eskimo parties; and nobody greets the same person more than once. Nyla and her husband Chuyulak were the last of the guests to arrive.

After a while Dalakduk felt there had been more than enough welcoming kuniks, and he asked each of his guests, and his wife too, how many people they had each greeted. Oddly, each of them gave him a different numerical answer.

- How many of the guests had Manaluk greeted?
- Manaluk had greeted Chuyulak. Had Nyla greeted Dalakaduk?

Please submit your solutions via e-mail to PuzZzles@aol.com (that's with 3 z's!) or by mail to PUZZLES, 17 Ravine Rd., Great Neck, NY 11023. Please submit answers as soon as possible to make the solvers list. And please send any ideas or any favorites for consideration for future issues to the same addresses.

Last Issue's Puzzle:

1. The Ping Pong "doubles" tournament. Suppose three equally matched opponents Andy, Bob, and Charlie decide to have a ping-pong tournament. Two people play against each other, with the winner of that game staying on and playing the person that sat out. The games continue until the winner is declared—that person being the first person to win two games in a row.

Drawing lots, it is determined that Andy and Bob play the first round with Charlie sitting out.

a. As the first game is just about to start, Philip states the odds of each of the three winning the tournament. Similarly, can you determine the mathematical odds of each one winning the tournament (without utilizing a computer)?

b. Charlie, not an actuary, was surprised when he heard Philip then mention the mathematical expectation that he had quickly calculated, of the number of games played in the tournament. How did Philip calculate this, what was it, and why was Charlie surprised?

Answer: a. Probability of Andy winning = probability of Bob winning = 5/14. Probability of Charlie winning is 2/7

b. Expected number of games played is precisely 3. As for why Charlie was surprised read solution below.

Solution: One approach to **a.** is as follows: Assume W is the winner, and L the loser, of the first round between Andy and Bob; assume C is Charlie.

If P(W) is probability of W winning the tournament, P(L) of L winning the tournament , and P(C) of Charlie winning tournament

Then P(C) = .5 * P(W); and P(L)=.25* P(W) and since these are the only possibile discrete events P(W)+P(C)+P(L)=1. Thus P(W)+.5P(W)+.25P(W)=1 or (7/4)P(W) =1; P(W)=4/7; and P(C)=2/7

And since probabilities of Andy and Bob winning is equal, their probability of winning the tournament must be (1-2/7)/2=5/14 each.

High school junior Ben Kester from Des Moines, Iowa sent in the following response.

I greatly enjoyed your puzzle for the May/June '04 magazine. My dad gets the *Contingencies* magazine, and I was attracted to the article on baseball and actuaries (because I play high school baseball and I am studying to become an actuary). I skimmed through the articles, and I read your puzzle and decided to solve it. So, here are my answers:

a. One way to calculate this is to make a tree depicting all of the possible scenarios and their possibilities. Philip decides to use this to calculate Charlie's probability of winning. Philip finds that Charlie has a 1/4 chance of winning the 1st time he plays, a 1/32 chance of winning the 2nd time he plays, a 1/256 chance of winning the 3rd time he plays, and so on. Philip quickly sees that Charlie's chance of winning is a geometric progression with the 1st number being 1/4 and the factor being 1/8. Solving the equation, he discovers that Charlie has a 2/7 chance of winning. Therefore, there is a 5/7 chance that either Andy or Bob would win. Since their probabilities of winning are the same, they both have a 5/14 chance of winning.

b. Philip realized that the probability of the tournament ending after the current game, after the first game has been played, is a geometric distribution with p = 0.5. This geometric function has a mean of 1, which is the expected number of unsuccessful games played (games that don't determine the winner) before the winner is decided is. Philip then adds back the first game, and the result is that the expected number of games played is 3. This surprises Charlie, because the only way for there to be exactly 3 games played is for Charlie to win. Since Charlie is not an actuary, he might then suspect that he is expected to win, since the expected result is him winning. However, Charlie's hopes are incorrect, because he does not realize that Philip is calculating the mean, not the most likely scenario. In fact, the "expected" scenario only has a 25% chance of occurring. ●

May/June Solvers

K. Balls, B. Bartholomew, B. Bock, R. Bottelli, G. Bridges, B. Byrne, L. Cappellano, M. Crooks, A. Dean, S. Donohue, L. Dyrland, C. Emma, E. Engelmayer, M. Evans, M. Failor, B. Feldman, C. Fievoli, Y. Fridman, B. Gabriel, J. Gold, J. Herder, J. Hill, B. Hupf, H. Ingraham, J. Kahn, T. Kelley, B. Kester, C. Kwok, W. Leisinger, M. Lynch, R. Malkani, S. Mathys, H.L. Michelson, B. Montiguez, P. Morse, J. Naylor, D. Oakden, R. Olson, D. Onnen, M. Parmenter, S. Peeples, L. Poole, D. Promislow, H.B. Ramsey Jr., E. Scher, J. Schwartz, W. Shur, A. Solak, A. Spooner, R. Stokes, T. Swankey, D. Thaller, T. Toce, A. Torrelli, K. Trapp, G. Turpie, J. Wasler, B. Whitney, Y. Yan, V. Young, L. Zeller

March/April Solver:

M. Failor

A PUZZLEMENT! Once again, *Contingencies* is looking for a dedicated puzzle fanatic to take over its puzzles page. We need someone whose aim in life is to challenge actuaries all over the world with fiendish puzzles of devious design. Schedule? Easy: We're bimonthly. Pay? Don't quit your day job. But the fun is priceless, and you'll get a byline! To volunteer, call or e-mail Steve Sullivan at (202) 223-8196 or sullivan@actuary.org.