which is equivalent to the formula given by Robin McLean.

Yours sincerely,
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More about Pig

DEAR SIR,

In Note 63.27 (December 1979) by S. Humphrey on the game of Pig, the author seems to have missed one important point. The object of the game is, roughly, to collect as many points as possible from successive throws of two dice, with the caveat that if a six should appear then the score drops back to zero again. It is claimed that one should go for three throws and then quit.

This would indeed be the correct strategy if one had to decide at the beginning of one's turn how many throws to attempt, but the rules suggest that one can decide after each throw whether to throw again or not. If the objective is to maximise one's expected score it is possible to use the information obtained during one's turn to improve on this strategy. What is important, after all, in deciding whether to have another throw is not how many throws one has had already, but how many points one is putting at risk.

Let us suppose, then, that our current score for that turn is r points. If we have another throw then the score will be increased by 2, 3, 4, 5, 6, 7, 8, 9, 10 points with probabilities $(1,2,3,4,5,4,3,2,1)/36$ respectively and will be decreased by r points with probability $11/36$. The expected increase for the next throw is thus

$$\frac{1 \times 2 + 2 \times 3 + \ldots + 1 \times 10 - 11 \times r}{36} = \frac{150 - 11r}{36},$$

which is positive if and only if $r < 14$. This shows that the optimal policy is to quit when one's score reaches 14 or more. This may well be after three throws but could be after 2, 4, 5, 6 or even 7 throws.

Nor is this the full story. One is after all playing against opponents and not just going for the highest expected score by oneself. There may well be times when it is worth risking all in order to reach the target before someone else, and other times when it is better to play safe. Since one's own strategy might well affect that of one's opponents, a complete analysis of the game would be quite complex, and we have not attempted to work out the details.

Yours faithfully,
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DEAR EDITOR,

In his Note S. Humphrey suggested that the best strategy when playing Pig was to aim to throw the pair of dice three times in a turn, and then stop. More generally, if the game is played with k dice, he suggested stopping after five or six throws for $k = 1$, two throws for $k = 3$ and one throw for $k > 3$.

This strategy can be improved upon by a player using his current score in a turn to decide whether or not to throw the dice again. If his present score for the turn is x, then, using k dice,