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## An Example: Unconditional Expectation and Variance - Quiz

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Use the following information for each of the following questions: Suppose that you are the swim coach for athletes that will be going to the Olympic Games to compete in swimming. Your athletes must swim in the heats and place highly enough or swim a fast enough time to make it through to the final race. Suppose that the probability of making the final race,  $p_F$ , is 0.4 or 40% for each athlete and each athlete's outcome is independent.

### Question 1

1/1 point (graded)


Using the same set up as in the previous question (recopied above for convenience), suppose that the team size  $N$  is now a random variable with expectation 2 and variance 1.5. What is the expectation of the number of swimmers that make it to the final?

*Please round your answers to 2 decimal places (e.g. if you obtain 0.443, round to 0.44 and if you obtain 0.445, round to 0.45).*


✓ Answer: 0.80

▼ **Module 5: Moments of a Random Variable, Applications to Auctions, & Intro to Regression**


**Moments of a Distribution and Auctions**

Finger Exercises due Oct 31, 2016 at 05:00 IST 

**Expectation, Variance, and an Introduction to Regression**

Finger Exercises due Oct 31, 2016 at 05:00 IST 

**Module 5: Homework**

Homework due Oct 24, 2016 at 05:00 IST 

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**Explanation**

Using the law of iterated expectations,

$$E[F] = E[E[F|N]] = E[Np_F] = p_F E[N] = 0.4 * E[N] = 0.4 * 2 = 0.8$$

Submit

You have used 1 of 2 attempts

✓ Correct (1/1 point)

**Question 2**

1/1 point (graded)

What is the variance of the number of swimmers that make it to the final?

*Please round your answers to 2 decimal places (e.g. if you obtain 0.443, round to 0.44 and if you obtain 0.445, round to 0.45).*

0.72

✓ Answer: 0.72

0.72

**Explanation**

Using the law of total variance:

$$\text{Var}(F) = \text{Var}(E[F|N]) + E[\text{Var}(F|N)] = \text{Var}(Np_F) + E[Np_F(1 - p_F)] =$$

$$p_F^2 \text{Var}(N) + p_F * (1 - p_F) * E(N) = 0.4^2 * 1.5 + 0.4 * 0.6 * 2 = 0.72$$

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You have used 1 of 2 attempts

✓ Correct (1/1 point)

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