

## Practice Quiz 9: Basic Probability and Risk vs. Return

1. What is the probability that, when two dice are rolled, the sum of the numbers on the two dice is five?
2. A casino offers a bet in which a gambler flips a coin three times. The gambler wins \$3 for flipping three heads, \$1 for flipping two heads, and nothing otherwise. What is the expected value of this game? Will the gambler make money, on average and in the long-run, if this game costs \$0.50 to play? What if the game costs \$1?
3. An investment returns 0% a quarter of the time, 16% another quarter of the time, and 8% the remaining half of the time. Calculate the expected return on this investment.
4. Discuss the law of large numbers.
5. Discuss the standard deviation and how it relates to financial risk.
6. Discuss the relationship between risk and return.
7. An investor uses a discount rate of 6% to value riskless investments. The investor is considering an investment that returns either \$30 or \$70, each with 50% probability, each year for four years. The cost of the investment is \$150. If the investor discounts the investment using the 6% discount rate, should she undertake the investment? If she is risk-averse, will she use a 6% discount rate? If she requires a risk premium of 5% on such a risky investment, should she undertake the investment?
8. Matt and Lindsay are both currently 20 years old and plan to retire in 45 years at 65. They hope to withdraw \$60,000 from their savings at the *beginning* of each year to live off of in retirement and want to save enough to last 40 years. They estimate they can earn an average return of 8% on their investments while saving for retirement, but after that will shift into less risky assets which they expect should yield around 3% per year. How much must Matt and Lindsay set aside at the *beginning* of each year to meet their goals? If Matt and Lindsay set aside this amount at the end of each year and earn 8% as expected during the first 44 years, but experience a stock market crash and lose 40% during the 45<sup>th</sup> year, how much will they have in their account at retirement? How much may they withdraw at the beginning of each year for 40 years in retirement if they earn the expected 3% on their savings? (Assume no inflation.)