Math 3355 Quiz 1

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Problem 1

Call the set of investors that invested in traditional annuities A, and the set of investors that invested in the stock market B. By the inclusion-exclusion principle, $|A \cup B| = |A| + |B| - |A \cap B|$. Solving for $|A \cap B|$, the size of the set of investors who invested in both, yields

$$|A \cap B| = |A| + |B| - |A \cup B| = 60\% + 35\% - 80\% = 15\%$$

Problem 2

The binomial theorem says $(a + b)^n = \sum_{k=0}^{n} \binom{n}{k} a^{n-k} b^k$. In this case, $a = 2x$ and $b = 5y$, and further since the power of x is 7 and that of y is 3, this corresponds to $n = 10$ and $k = 3$. Therefore, the full corresponding term is $\binom{10}{4}(2x)^7(5y)^3$. Pulling the constant terms out of the exponentiations yields a coefficient of $\binom{10}{4} \cdot 2^7 \cdot 5^3 = 3,360,000$.

Problem 3

The probability that a random point from (a, b) falls into a subinterval (α, β) is $\frac{\beta - \alpha}{b - a}$ by definition of random selection. In this case, $(a, b) = (0, 1)$ and $(\alpha, \beta) = (\frac{1}{3}, 1)$, so the probability the random point is drawn from the latter interval is

$$\frac{\beta - \alpha}{b - a} = \frac{1 - \frac{1}{3}}{1 - 0} = \frac{2}{3}$$