Econ 57
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Midterm Answers

1. Survivor bias. They omitted funds that existed 5 years ago and are no longer around. When Vanguard included funds that existed 5 years ago and subsequently folded, the percent that beat the market fell to 46%. (This was actually a study of large cap funds.)

2. The year 1987 is omitted and the data are not adjusted for the increase in the price level or in the number of households.

3. They are equally likely to have a positive return because their Z-values are equal:

$$Z_1 = \frac{0-5}{10} = -0.5$$

$$Z_2 = \frac{0-10}{20} = -0.5$$

4. The same as the probability of picking any six numbers:

$$\frac{6}{47}\frac{5}{46}\frac{4}{45}\frac{3}{44}\frac{2}{43}\frac{1}{42}$$

5. The six coins are equally likely to be chosen. Of the 3 gold coins, 2 are in the double-gold drawer. So, the probability that you chose the double-gold drawer is 2/3. Therefor, sticking with the drawer you chose has a 2/3 probability of yielding a gold coin.

   This can also be done via Bayes' Rule, letting *GG* be the double-gold drawer and letting *PG* be "pick a gold coin."

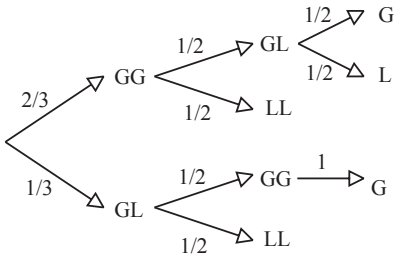
$$P[GG \text{ if } PG] = \frac{P[GG]P[PG \text{ if } GG]}{P[GG]P[PG \text{ if } GG] + P[GS]P[PG \text{ if } GS] + P[SS]P[PG \text{ if } SS]}$$

$$= \frac{(1/3)(1)}{(1/3)(1) + (1/3)(1/2) + (1/3)(0)}$$

$$= 2/3$$

   [Not asked] If you switch, there is a 2/3 probability you initially chose the double-gold drawer, in which case you have an equal chance of choosing the double-lead or gold-lead drawer; if you do choose the lead-gold drawer, there is 1/2 probability of choosing the gold coin. There is a 1/3 probability that you initially chose the gold-lead drawer, in which case you have an equal chance of choosing the double-lead or double-gold drawer; if you do choose the double-gold drawer, you are certain to choose a gold coin.

   Overall, if you switch, the probability of getting a gold coin is (2/3)(1/2)(1/2) + (1/3)(1/2)(1) = 1/3



6. Outliers

7. a. The calculation assumes independence, but there may be genetic or environmental factors that contradict this assumption.
   b. This reverses the conditional probabilities. P[2 deaths if innocent] ≠ P[innocent if 2 deaths]

8. a. Whatever team number Ocean gets, each of the other 15 students has an equal chance of being on Ocean's team: 1/15.
   b. The probability that Ocean and Cove will be on the same team at least once in 12 weeks is equal to 1 minus the probability that they will never be on the same team: $1 - (14/15)^{12} = 0.56$

9. The probability of making a shot is not constant because shots are taken from different locations and with differing amounts of defensive pressure.

10. Self-selection bias. Perhaps those most at risk of reconviction were more likely to be given talk therapy.