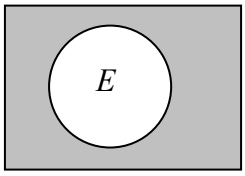
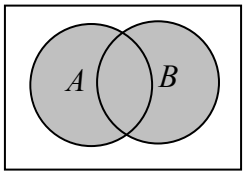
Mth 102 – General Education Statistics – Practice Exam 3 – Solutions

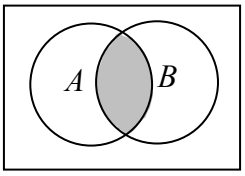
1. Let A = person is male and B = person is under 18. We want $P(A \text{ or } B)$.
   $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B) = 0.796 + 0.183 - 0.135 = 0.844$
2. $P(\textit{all heads}) = \frac{1}{8}$
3. There are many correct answers. One possibility: A = # rolled is even, B = # rolled is odd
4.
   a. $P(\text{between 40 and 44 years old, inclusive}) = \frac{1213}{11527} \approx 0.105$
   b. $P(\text{at least 25 years old}) = 1 - P(\text{less than 25 years old}) = 1 - \frac{2916}{11527} \approx 0.747$
   c. $P(\text{under 30 or over 54}) = \frac{2916 + 2175 + 372}{11527} \approx 0.474$
5. $P(\text{not } E) = 1 - P(E) = 1 - 0.25 = 0.75$
6.
   a. (not C) = the card drawn is *not* a face card
   b. (A or B) = the card drawn is a diamond or a queen (or both)
   c. (A and C) = the card drawn is one of the Jd, Qd, or Kd
7.
   a. (not E)

   b. (A or B)

   c. (A & B)

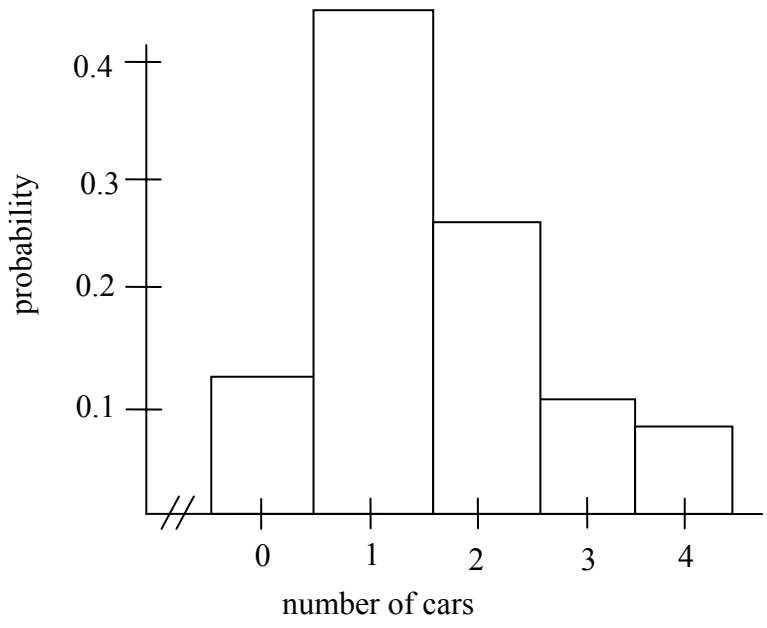
8. C or D = spade or face card = As, 2s, … Qs, Ks, plus Jd, Qd, Kd, Jh, Qh, Kh, Jc, Qc, Kc
   $P(C \text{ or } D) = P(\text{ spade or face card}) = \frac{22}{52} = \frac{11}{26}$.
9. No, since $\sum P(X = x) \neq 1$.
10. Let X = amount won , then X can be 100000, 100, 10, 1, or -1. The probability for $X = -1$ is the probability of a loss, so
    $P(\textit{loss}) = 1 - P(\textit{win}) = 1 - (0.000002 + 0.0003 + 0.0096 + 0.091) = 0.899098$.
    The expected value is then:
    $E(X) = (100000)(0.000002) + (100)(0.0003) + (10)(0.096) + (1)(0.091) + (-1)(0.899098) = \approx -0.48$
    This means you can expect to *lose* \$0.48 every time you play the Little Lotto!

11.

a.

X	$P(X = x)$
0	0.125
1	0.428
2	0.256
3	0.108
4	0.083

b.



c. $E(X) = \sum xP(X = x) = (0)(0.125) + (1)(0.428) + (2)(0.256) + (3)(0.108) + (4)(0.083) = 1.596$

12. n is the number of "trials", so $n = 30$. p is the probability of success, so $p = \frac{1}{4}$ (we're just guessing, so we have a 1 in 4 chance of getting it right.)

13. Note: $n = 10$ and $p = 0.8$.

a. $P(X = 1) = \binom{10}{1}(0.8)^1(0.2)^9 \approx 0.000\,0041$

b. $P(X \le 1) = P(X = 0) + P(X = 1) = \binom{10}{0}(0.8)^0(0.2)^{10} + \binom{10}{1}(0.8)^1(0.2)^9 \approx 0.000\,0042$

c. $P(X > 1) = 1 - P(X \le 1) = 1 - 0.000\,0042 \approx 0.999\,996$.

d. $\mu = np = (10)(0.8) = 8, \quad \sigma = \sqrt{np(1-p)} = \sqrt{10(0.8)(1-0.8)} \approx 1.26$