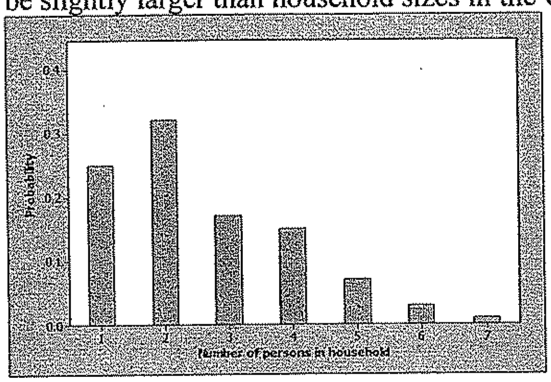
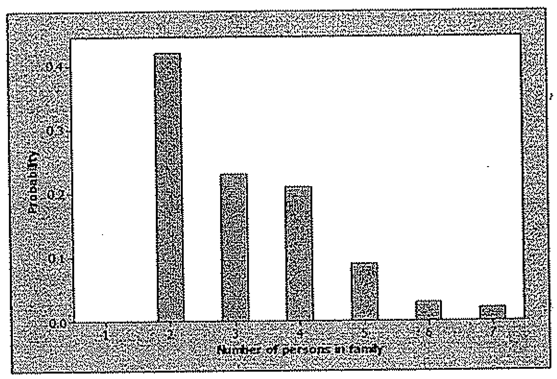
HW Section 7.1

7.7 (a) $P(X < 0.49) = 0.49$. (b) $P(X \leq 0.49) = 0.49$. *Note: (a) and (b) are the same because there is no area under the curve at any one particular point.* (c) $P(X \geq 0.27) = 0.73$. (d) $P(0.27 < X < 1.27) = P(0.27 < X < 1) = 0.73$. (e) $P(0.1 \leq X \leq 0.2 \text{ or } 0.8 \leq X \leq 0.9) = 0.1 + 0.1 = 0.2$. (f) $P(\text{not } [0.3 \leq X \leq 0.8]) = 1 - 0.5 = 0.5$. Or $P(0 \leq X < 0.3 \text{ or } 0.8 < X \leq 1) = 0.3 + 0.2 = 0.5$ (g) $P(X = 0.5) = 0$.

7.8 (a) $P(0 \leq X \leq 0.4) = 0.4$. (b) $P(0.4 \leq X \leq 1) = 0.6$. (c) $P(0.3 \leq X \leq 0.5) = 0.2$. (d) $P(0.3 < X < 0.5) = 0.2$. (e) $P(0.226 \leq X \leq 0.713) = 0.713 - 0.226 = 0.487$. (f) A continuous distribution assigns probability 0 to every possible outcome. In this case, the probabilities in (c) and (d) are the same because the events differ by 2 possible values, 0.3 and 0.5, each of which has probability 0.

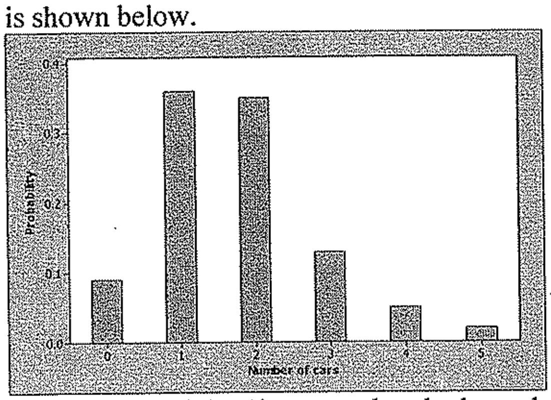
7.12 (a) All of the probabilities are between 0 and 1, and both sets of probabilities sum to 1. (b) Both distributions are skewed to the right. However, the event $\{X = 1\}$ has a much higher probability in the household distribution. This reflects the fact that a family must consist of two or more persons. A closer look reveals that all of the values above one, except for 6, have slightly higher probabilities in the family distribution. These observations and the fact that the mean and median numbers of occupants are higher for families indicates that family sizes tend to be slightly larger than household sizes in the U.S.





7.13 (a) "More than one person lives in this household" can be written as $\{Y > 1\}$ or $\{Y \geq 2\}$. $P(Y > 1) = 1 - P(Y = 1) = 0.75$. (b) $P(2 < Y \leq 4) = P(Y = 3) + P(Y = 4) = 0.32$. (c) $P(Y \neq 2) = 1 - P(Y = 2) = 1 - 0.32 = 0.68$.

7.14 (a) All of the probabilities are between 0 and 1 and they add to 1. A probability histogram is shown below.



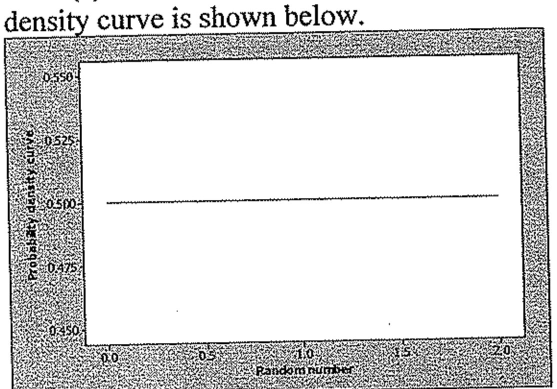
(b) The event $\{X \geq 1\}$ means that the household owns at least one car. $P(X \geq 1) = P(X = 1) + P(X = 2) + P(X=3) + P(X=4) + P(X = 5) = 0.91$. Or $P(X \geq 1) = 1 - P(X < 1) = 1 - P(X = 0) = 1 - 0.09 = 0.91$. (c) $P(X > 2) = P(X = 3) + P(X = 4) + P(X = 5) = 0.20$, so 20% of households own more cars than a two-car garage can hold.

7.15 (a) All of the probabilities are between 0 and 1 and they add to 1. (b) 75.2% of fifth-graders eventually finished twelfth grade. (c) $P(X \geq 6) = 1 - 0.010 - 0.007 = 0.983$. Or $P(X \geq 6) = P(X=6) + P(X=7) + P(X=8) + P(X=9) + P(X=10) + P(X=11) + P(X=12) = 0.983$. (d) $P(X > 6) = 1 - 0.010 - 0.007 - 0.007 = 0.976$. Or $P(X > 6) = P(X=7) + P(X=8) + P(X=9) + P(X=10) + P(X=11) + P(X=12) = 0.976$. (e) Either $X \geq 9$ or $X > 8$. The probability is $P(X \geq 9) = P(X=9) + P(X=10) + P(X=11) + P(X=12) = 0.068 + 0.070 + 0.041 + 0.752 = 0.931$.

7.16 (a) Let S = {student supports funding} and O = {student opposes funding}. $P(SSO) = 0.6\times0.6\times0.4 = 0.144$. (b) The possible combinations are SSS, SSO, SOS, OSS, SOO, OSO, OOS, and OOO. $P(SSS) = 0.6^3 = 0.216$, $P(SSO) = P(SOS) = P(OSS) = 0.6^2\times0.4 = 0.144$, $P(SOO) = P(OSO) = P(OOS) = 0.6\times0.4^2 = 0.096$, and $P(OOO) = 0.4^3 = 0.064$. (c) The probability distribution of X is given in the table below. The probabilities are found by adding the probabilities from (b). For example, $P(X = 1) = P(SSO \text{ or } SOS \text{ or } OSS) = 0.144 + 0.144 + 0.144 = 3\times0.144 = 0.432$. (d) The event "a majority of the advisory board opposes funding" can be written as $\{X \geq 2\}$ or $\{X > 1\}$. The probability of this event is $P(X \geq 2) = 0.288 + 0.064 = 0.352$.

Value of X	0	1	2	3
Probability	0.216	0.432	0.288	0.064

7.17 (a) The height should be 1/2 or 0.5 since the area under the curve must be 1. A graph of the density curve is shown below.



(b) $P(Y \leq 1) = 1\times0.5 = 0.5$. (c) $P(0.5 < Y < 1.3) = 0.8\times0.5 = 0.4$. (d) $P(Y \geq 0.8) = 1.2\times0.5 = 0.6$.