ASSAIGNMENT 1:

Complete exercises: 2.12, 2.14, 2.28 and 2.30

ANSWERS:

2.12 Miss 1 day of school : 25% = .25
" 2 days " " : 15% = .15
" ≥ 3 days " " : 28% = .28

a) $P(\text{Miss 0 day of school}) = 1 - P(\text{Miss school})$
$= 1 - (.25 + .15 + .28)$
$= 1 - 0.68$
$= 0.32$

32% of students did not miss any days of school.

b) $P(\text{Miss} \leq 1 \text{ day of school})$
$= P(\text{Miss 0 day of school}) + P(\text{miss 1 day})$
$= 0.32 + 0.28$
$= 0.57$

57% of students miss no more then 1 day of school.

c. $P(\text{miss} \geq 1 \text{ day}) = P(\text{miss 1 day}) + P(\text{miss 2 days}) + P(\text{miss} \geq 3 \text{ days})$
$= 0.25 + 0.15 + 0.28$
$= 0.68$

68% of students miss at least 1 day

d. P(2 children not missing school)
$= P(1^{st}$ child not miss school$) \times P(2^{nd}$ child not miss$)$
$= 0.32 \times 0.32$
$= 0.1024$

There is a 10.24% chance that neither student miss school.

e. P(Both children missing school)
$= P(1^{st}$ child miss$) \times P(2^{nd}$ child miss$)$
$= .68 \times .68$
$= 0.4624$

There is a 46.24% chance that both children will miss school.

f. For d and e I assumed that there is no connection between the children missing school. Each children chances of missing school is independent of the other children missing school.

2.14 Weight and health coverage Part I:

a. P(1 person who is overweight and doesn't have coverage) = $\frac{15,327}{428,638}$ = 0.0358

There is a 3.58% chance a person chosen at random will be overweight and does not have health coverage.

b. P(1 person who is overweight or doesn't have coverage)

= P(Person overweight) + P(Person without coverage) − P(Person overweight and without coverage)

$= \left(\frac{157,026}{428,638}\right) + \left(\frac{44,837}{428,638}\right) - 0.0358$

= 0.3663 + 0.1046 − 0.0358

= 0.4351

There is a 43.51% chance a person chosen at random will be overweight or does not have health coverage.

2.28 4 blue socks
5 gray socks
3 black socks
12 socks in total
(assuming that they are not talking about a pair of socks)

a. $P(2 \text{ blue socks}) = P(1^{st} \text{ sock is blue}) \times P(2^{nd} \text{ sock blue})$

$= \frac{4}{12} \times \frac{3}{11}$

$= 0.0909$

There is a 9.09% chance both socks to be blue

b. $P(\text{neither gray socks}) = P(1^{st} \text{ not grey sock}) \times P(2^{nd} \text{ not gray})$

$= [1 - P(\text{gray socks})] \times [1 - P(\text{gray socks})]$

$= [1 - 5/12] \times [1 - 5/11]$

$= 0.5833 \times 0.5455$

$= 0.3181$

There is a 31.81% chance that neither socks is gray

c. $P(\text{at least 1 black sock}) =$

$= P(1^{st} \text{ sock black}) + P(2^{nd} \text{ sock black})$

$= [P(\text{black sock}) \times P(\text{Not black})] + [P(\text{Not black}) \times P(\text{Black})]$

$= \left[\frac{3}{12} \times \frac{9}{11}\right] + \left[\frac{9}{12} \times \frac{3}{11}\right]$

$= 0.2045 + 0.2045 = 0.4090$

5

There is a 40.9% chance of having at least 1 black sock.

d. $P(\text{a green sock}) = [1 - P(\text{Not a green sock})] \times [1 - P(\text{Not green})]$

$= [1 - \frac{12}{12}] \times [1 - \frac{11}{11}]$
$= 0 \times 0$
$= 0$

There is a 0% chance of having a green sock.

e. $P(\text{matching socks}) = P(2\text{ black}) + P(2\text{ blue}) + P(2\text{ gray})$
$= [\frac{3}{12} \times \frac{2}{11}] + [0.0909] + [\frac{5}{12} + \frac{4}{11}]$

$= 0.0455 + 0.0909 + 0.1515$
$= 0.2879$

There is a 28.79% chance of have a matching pair of socks.

2.30 Books on a bookshelf.

a. P(1st a hardcover then a Paperback fiction

$= P(\text{a hardcover}) \times P(\text{a Paperback fiction})$

$= \frac{28}{95} \times \frac{59}{94}$

$= 0.1850$

There is a 18.50% chance the 1st book is a hardcover then a paperback fiction.

b. P(1st fiction then hardcover)

$= \{pFH, hFH\}$ where pF = Paperback fiction
hF = hardcover fiction

$= \left[\frac{59}{95} \times \frac{28}{94}\right] + \left[\frac{13}{95} \times \frac{27}{94}\right]$

$= 0.1850 + 0.0393$

$= 0.2243$

There is a 22.43% chance the 1st book is fiction then a hardcover

c. P(1st fiction then hardcover with replacement)

$= P(\text{fiction}) \times P(\text{hardcover})$

$= \frac{72}{95} \times \frac{28}{95} = 0.2234$

There is a 22.34% chance the 1st book is a fiction then the 2nd book a hardcover with replacement.

7

d. The final answers to part (b) 22.43% and (c) 22.34% is very similar. This is because the sample size is not small, it is 94. If we had a bigger sample size then the change in one book (with replacement or without replacement) would be barely noticeable.