3.1.16, 3.2.18, 3.3.7, 3.4.14, 3.5.16, 3.6.9

<u>3.1.16</u>] Given: Format of Table 2.
Inputs $P_a = 10$ mil, $P_b = 80$ mil, $P_c = 50$ mil
Absolute percentage error of 10%.
<u>Find</u>: Create table from given inputs.

<u>Assumptions</u>: none

<u>Solution</u>:   see HW4.R

<u>3.2.18</u>]   Given: Formulae for regression line $y = mx + b$:
$$m = \frac{n\Sigma xy - \Sigma x \Sigma y}{n\Sigma x^2 - (\Sigma x)^2} \quad , \quad b = \bar{y} - m\bar{x}$$
$n = \#$ of points
and input data (2 arrays) for x and y.
<u>Find</u>: Write program to calculate equation of regression line.
<u>Assumptions</u>: none

<u>Solution</u>:   see HW4.R

<u>3.3.7</u>] <u>Given</u>: Format of table in Figure 14 for dice rolls.
Regression line $s = af + b$ where s = outcome of 2nd die, f = outcome of 1st die
Formula for $R^2 = \Sigma(\hat{s}_i - \bar{s})^2 / \Sigma(s_i - \bar{s})^2$
<u>Find</u>: a) Write program to simulate roll of pair of dice 5 times. Have program print table as in fig. 14.
b) Have program calculate a & b of regression line.
c) "   "   calculate R^2
d) Modify program to repeat above steps (not printing table) 100 times, printing table with highest R^2.
<u>Solution</u>:   see HW4.R

<u>3.4.14</u>] Given: Arrays of data x, y, z.

<u>Find</u>: Write program to find regression equation and R^2 where $z = ax + by + c$
<u>Assumptions</u>: none

<u>Solution</u>: see HW4.R

<u>3.5.16</u>] Given: Pair of rabbits born @ $t = 0$ produce pair at $t = 2$ months and another every month after.
<u>Find</u>: a) How many rabbit pairs for $t = 0$ through 10 (Fibonacci)
b) Show that $f_t = f_{t-1} + f_{t-2}$ where f_t is prs @ t
c) Compute $(1 + \sqrt{5}/2)^t + (1 - \sqrt{5}/2)^t$ for $t = 0, \ldots, 20$, show that this yields Fibonacci sequence.
<u>Assumptions</u>: none

<u>Solution</u>: a) see next pg.

3.5.16 cont)

Time	Pairs			
	0 mos	1 mos	mature	total
0	1	0	0	1
1	0	1	0	1
2	1	0	1	2
3	1	1	1	3
4	2	1	2	5
5	3	2	3	8
6	5	3	5	13
7	8	5	8	21
8	13	8	13	34
9	21	13	21	55
10	34	21	34	89

⇒ Fibonacci

b) The number of pairs at each stage is equal to the number from the previous stage plus the number of new pairs which are offspring from the number from the stage two time steps prior.

$$\Rightarrow f_t = f_{t-1} + f_{t-2}$$

c) see HW4.R (note typo in formula)

3.6.9| Given: Circular motion of C around E and P around C to create epicycles. $R_{EC} = 4$, $R_{PE} = 1$, with orbital velocities of v_1 and v_2, respectively, in units of degrees/ time step.

Find: Write code to graph epicycles. Choose values of v_1 and v_2 to replicate epicycles of Fig. 4

Assumptions: none

Solution: see HW4.R