Finite Math Section 1_5
Solutions and Hints

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for the book:
Finite Mathematics, 7th Edition
by S. T. Tan.

DO NOT PRINT THIS OUT AND TURN IT IN !!!!!!!!
This is designed to assist you in the event you get stuck.
If you do not do the work you will NOT pass the tests.

Section 1.5:

It is extremely likely you will be given a calculator program to work out this type of problem. It is MUCH easier with a calculator. I STRONGLY encourage you to learn how to do it using the calculator. I do NOT have the program.

However there is a way to do it using the calculator's built in functions.

It goes something like this (on the TI-83):
The [2nd]-[stats] should get you to Lists.
You will enter into L1 the x-values of the problem.
You will enter into L2 the y-values of the problem.
You will then escape out of the list entry.
You will then press the [stats] button and select the function lin-reg
It will automatically use the values in L1 and L2.
It will output something in the form of y = mx + b, which will be the answer to most of the problems in this section.

These problems WILL show up on tests. Learn how to do them using the calculator!

Below is an example of how to do one by hand.

Problem 14:

The Social Security (FICA) wage base (in thousands of dollars) from 1996 to 2001 is given in the accompanying table:

Year:	1996	1997	1998	1999	2000	2001
Wage Base, y:	62.7	65.4	68.4	72.6	76.2	80.4

a. Find an equation of the least squares line for these data
(Let x = 1 represent the year 1996)

The needed table:

	x	y	x^2	xy
	1	62.7	1	62.7
	2	65.4	4	130.8
	3	68.4	9	205.2
	4	72.6	16	290.4
	5	76.2	25	381
	6	80.4	36	482.4
Sum	21	425.7	91	1552.5

Notice the number of data points = 6.

The normal equations are (compare color of numbers to see where they come from):
6b + 21m = 425.7
21b + 91m = 1552.5

And then you solve the above system to get m and b. Notice m and b will be your slope and y-intercept in the final equation (which of course will be in slope-intercept form).

So solve equation 1 for b:
6b + 21m = 425.7 → 6b = 425.7 – 21m
b = 70.95 – 3.5m

Put 70.95 – 3.5 into equation 2 for b and solve for m:
21b + 91m = 1552.5 → 21*(70.95 – 3.5m) + 91m = 1552.5
1489.95 – 73.5m + 91m = 1552.5
1489.95 + 17.5m = 1552.5
17.5m = 62.55
m = 3.57429

Put m = 3.57429 in for m into equation 1 and solve for b:
6b + 21m = 425.7 → 6b +21*3.57429 = 425.7
6b + 75.06 = 425.7
6b = 425.7 – 75.06
6b = 350.64
b = 58.44

So the least-squares line for the given set of data points is:
y = mx + b → **y = 3.57429x + 58.44**

b. Use the result of part (a) to estimate the FICA wage base in the year 2005
Recall 1996 → x = 1, so 2005 → x = 10
Think about it: 96 → 1
97 → 2
98 → 3
99 → 4
00 → 5
01 → 6
02 → 7
03 → 8
04 → 9
05 → 10

So put 10 in for x into our equation:
y = 3.57429x + 58.44 → y = 3.57429*10 + 58.44 → **y = 94.1829**
