1994
Tax Rate Schedule

Schedule X—Use if your filing status is **Single**

If the amount on Form 1040, line 37, is: *Over—*	*But not over—*	Enter on Form 1040, line 38		*Of the amount over—*
$0	$22,750	----------	**15%**	**$0**
22,750	55,100	**$3,412.50 +**	**28%**	**22,750**
55,100	115,000	**12,470.50 +**	**31%**	**55,100**
115,000	250,000	**31,039.50 +**	**36%**	**115,000**
250,000	----------	**79,639.50 +**	**39.6%**	**250,000**

(on next page)

Now we should be able to write a formula for the income-tax graph in Figure 2.12, referring to Schedule X for precise values. The graph has five connected segments, each with a separate slope. We already know the slope of each segment—0.15, 0.28, 0.31, 0.36, and 0.396—and we know the income at which each segment begins. That's all the information we need. The function's name is *TAX*; x will represent the amount of taxable income.

The first segment has slope 0.15 and passes through the point (0, 0).

The second segment has slope 0.28 and applies only to the portion of income above $22,750 (and not above $55,100). We write $0.28(x - 22{,}750)$ to indicate a tax of 28% on that portion of the income, and we must also add the $3,412.50 owed on the first $22,750. The second segment can be written as $y = 0.28(x - 22{,}750) + 3{,}412.50$. The expression $0.28(x - 22{,}750) + 3{,}412.50$ isn't in standard "$mx + b$" form. It *could* be written that way, but we'd lose information about what the function means. That's the beauty of algebra: we can choose the form that works best in the situation.

Our procedure for the third segment will be similar: use that tax rate and write a mathematical expression showing that it applies to income above $55,100; then add the amount owed on the first $55,100, that is, $12,470.50.

Our function so far looks like this:

$$TAX(x) = \begin{cases} 0.15x & \text{for } 0 \le x \le 22{,}750 \\ 0.28(x - 22{,}750) + 3{,}412.50 & \text{for } 22{,}750 < x \le 55{,}100 \\ 0.31(x - 55{,}100) + 12{,}470.50 & \text{for } 55{,}100 < x \le 115{,}000 \\ & \end{cases}$$

You might have noticed that we did not bother to find the "b"-value for each segment, that is, the place where it would intercept the y-axis if it went that far. The reason for the omission is that the y-intercepts of the segments after the first one have no significance in the model. We wrote each segment in the form most likely to convey income-tax information to a reader.

① Now complete the formula for TAX (x) started above.
② Use your formula TAX(x) to calculate TAX (100,000) and TAX (200,000) and then plot your results on a printout of figure 2.12 (on the next page) to show your formula agrees with the given graph.

The piecewise linear graph shown below (figure 2.12) will help to interpret the meaning of "slope" in the context of income tax: the slope of each line segment is the tax rate for that income bracket. You've heard people talk about being "in the 28% bracket." They mean that (for 1994, anyway, and assuming they were single) their taxable income fell between $22,750 and $55,100. The units associated with the slope in this example are "dollars of tax per dollar of income." Within the 28% bracket, every additional dollar of income costs the wage earner 28 cents (0.28 dollars) in tax. The slope of the second segment, then, is 0.28 dollars of tax for every dollar of income.

Figure 2.12 looks like the graph you should have drawn for the income-tax function. If yours looks different, please try now to understand what information this graph conveys and why it is the correct one.

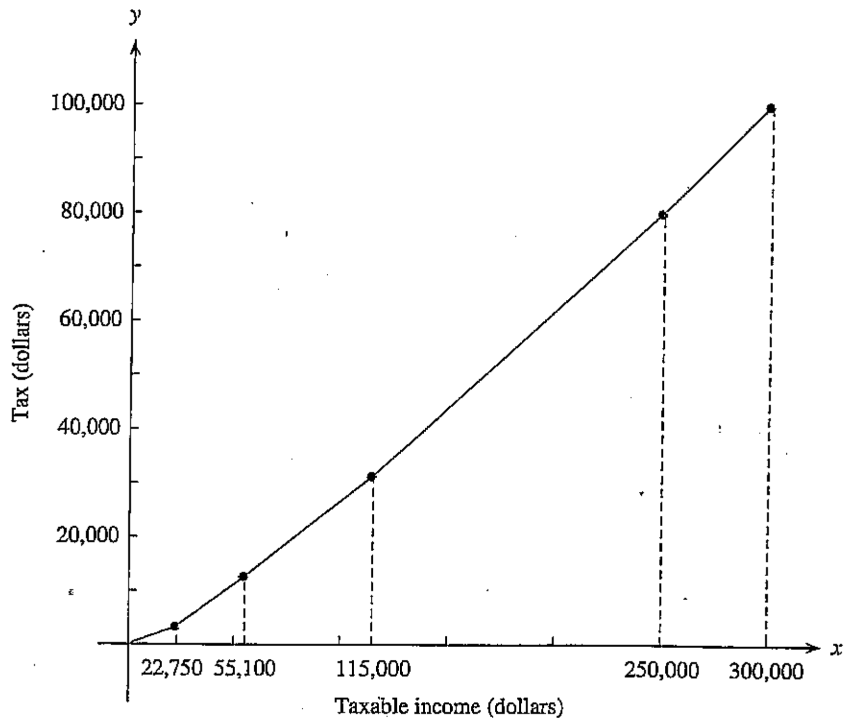

Figure 2.12 Graph of Income-Tax Function Based on Schedule X, 1994

The graph is that of a piecewise linear function with five connected segments, each with a different slope.