Applications

Taxes are paid in the sweat of every man who labors.
—Franklin D. Roosevelt

1. How can the quote be interpreted in light of what you have learned?

Use Schedule X for a single taxpayer for Exercises 2 and 3.

2. There are seven taxable income intervals in this chart. Let x represent any taxable income. Express those intervals in tax schedule notation, compound inequality, and interval notation. See additional answers.

Schedule X-If your filing status is **Single**

If your taxable income is:		The tax is:	
Over—	*But not over—*		*of the amount over—*
$0	$9,225	..... 10%	$0
9,225	37,450	$922.50 + 15%	9,225
37,450	90,750	5,156.25 + 25%	37,450
90,750	189,300	18,481.25 + 28%	90,750
189,300	411,500	46,075.25 + 33%	189,300
411,500	413,200	119,401.25 + 35%	411,500
413,200	.....	119,996.25 + 39.6%	413,200

3. Let y represent the tax and x represent the taxable income of a single taxpayer. See margin.
   a. Use the tax schedule to write three equations in $y = mx + b$ form for values of x that are greater than or equal to $200,000.
   b. Use the distributive property and combine like terms to show how the equations relate to the Section A tax computation worksheet below. Show your work and explain your reasoning.

Section A–Use if your filing status is **Single.** Complete the row below that applies to you.

Taxable income If line 43 is–	**(a)** Enter the amount from line 43	**(b)** Multiplication amount	**(c)** Multiply (a) by (b)	**(d)** Subtraction amount	**Tax** Subtract (d) from (c). Enter the result here and on Form 1040, line 44
At least $100,000 but not over $189,300	$	× 28% (0.28)	$	$6,928.75	$
Over $189,300 but not over $411,500	$	× 33% (0.33)	$	$16,393.75	$
Over $411,500 but not over $413,200	$	× 35% (0.35)	$	$24,623.75	$
Over $413,200	$	× 39.6% (0.396)	$	$43,630.95	$

4. Write a piecewise function to represent the tax $f(x)$ for the first three taxable income intervals in Schedule Y-2 for a married taxpayer who is filing separately. See additional answers.

Schedule Y-2-If your filing status is **Married filling separately**

If your taxable income is:		The tax is:	
Over—	*But not over—*		*of the amount over—*
$0	$9,225	..... 10%	$0
9,225	37,450	$922.50 + 15%	9,225
37,450	75,600	5,156.25 + 25%	37,450
75,600	115,225	14,693.75 + 28%	75,600
115,225	205,750	25,788.75 + 33%	115,225
205,750	232,425	55,662.00 + 35%	205,750
232,425	.....	64,998.25 + 39.6%	232,425

TEACH

Exercise 4
Make sure that students have identified the correct domain for each portion of the piecewise function. It is important that the endpoints are included (or excluded) correctly.

ANSWERS

1. Income taxes are workers' taxes. Therefore, the taxes that are collected are a direct function of the work that the taxpayers do.

3a. $y = 46{,}075.25 + 0.33(x - 189{,}300)$
$y = 119{,}401.25 + 0.35(x - 411{,}500)$
$y = 119{,}996.25 + 0.396(x - 413{,}200)$

b. The equations demonstrate the transformation from the tax schedule to the tax worksheet using the distributive property.
$y = 0.33x - 16{,}393.75$
$y = 0.35x - 24{,}623.75$
$y = 0.396x - 43{,}630.95$

2000 Tax Rate Schedule

Schedule Y-1— If your filing status is **Married filing jointly** or **Qualifying widow(er)**

If the amount on Form 1040 line 39, is: *Over—*	*But not over—*	Enter on Form 1040 line 40	*of the amount over—*
$0	$43,850	..... 15%	$0
43,850	105,950	$6,577.50 + 28%	43,850
105,950	161,450	23,965.50 + 31%	105,950
161,450	288,350	41,170.50 + 36%	161,450
288,350	.....	86,854.50 + 39.6%	288,350

2012 Tax Rate Schedule

Schedule Y-1–If your filing status is **Married filling jointly** or **qualifying widow(er)**

If your taxable income is: *Over—*	*But not over—*	The tax is:	*of the amount over—*
$0	$17,400	..... 10%	$0
17,400	70,700	$1,740.00 + 15%	17,400
70,700	142,700	9,735.00 + 25%	70,700
142,700	217,450	27,735.00 + 28%	142,700
217,450	388,350	48,665.00 + 33%	217,450
388,450	.....	105,062.00 + 35%	388,350

1998 Tax Rate Schedule

Schedule X— If your filing status is **Single**

If the amount on Form 1040 line 39, is: *Over—*	*But not over—*	Enter on Form 1040 line 40	*of the amount over—*
$0	$25,350	..... 15%	$0
25,350	61,400	$3,802.50 + 28%	25,350
61,400	128,100	13,896.50 + 31%	61,400
128,100	278,450	34,573.50 + 36%	128,100
278,450	.....	88,699.50 + 39.6%	278,450

5. Use the 2000 Schedule Y-1 for a married taxpayer filing jointly. Write an equation in $y = mx + b$ form for a taxable income in the interval over $105,950 but not over $161,450. $y = 0.31x - 8{,}879$
6. Use the 2012 Schedule Y-1 for a married taxpayer filing jointly. Write the piecewise function for the tax intervals. See additional answers.
7. Use Tax Schedule Y-1 from Example 1 and Exercises 5 and 6. Select any income. Write an equation for that income for the three different years. Answers vary.
8. In 1999, a single taxpayer used this 1998 Schedule X. Let x represent the single taxpayer's taxable income and y represent that taxpayer's tax. Express the tax schedule as a piecewise function. See additional answers.
9. Use the Section D tax computation worksheet for a head-of-household taxpayer. Let x represent the taxpayer's taxable income and y represent the tax. Express each line of the worksheet as a linear equation in $y = mx + b$ form. Use interval notation to define the income range on which each of your equations is defined. See additional answers.

Exercises 6–8
Offer students practice with a variety of different schedules.

Section D–Use if your filing status is **Head of household.** Complete the row below that applies to you.

Taxable income If line 43 is–	**(a)** Enter the amount from line 43	**(b)** Multiplication amount	**(c)** Multiply (a) by (b)	**(d)** Subtraction amount	**Tax** Subtract (d) from (c). Enter the result here and on Form 1040, line 44
At least $100,000 but not over $129,600	$	× 25% (0.25)	$	$5,677.50	$
Over $129,600 but not over $209,850	$	× 28% (0.28)	$	$9,565.50	$
Over $209,850 but not over $411,500	$	× 33% (0.33)	$	$20,058.00	$
Over $411,500 but not over $439,000	$	× 35% (0.35)	$	$28,288.00	$
Over $439,000	$	× 39.6% (0.396)	$	$48,482.00	$

10. *You are given this portion of a tax schedule from a previous year for single taxpayers with incomes over $71,950.*

10a. $y = 0.28x - 6{,}083.50$
$y = 0.33x - 12{,}951$
$y = 0.35x - 19{,}529.75$

If your taxable income is: Over—	But not over—	The tax is:	of the amount over—
71,950	150,150	**14,062.50 + 28%**	**71,950**
150,150	326,450	**36,598.50 + 33%**	**150,150**
326,450	--------	**94,727.75 + 35%**	**326,450**

a. Model each of the three rows as a simplified equation in $y = mx + b$ form. See margin.

b. Create an associated tax computation spreadsheet for the tax schedule using the linear equations you have identified. A template for the worksheet is shown below. See additional answers.

	A	B	C	D	E	F
1	**Taxable Income**	**(a) Enter taxable income**	**(b) Multiplication amount**	**(c) Multiply (a) by (b)**	**(d) Subtraction amount**	**Tax Subtract (d) from (c)**
2	At least $71,950 but not over $150,150					
3	Over $150,150 but not over $326,450					
4	Over $326,450					

11. Examine the following Section C tax computation worksheet. Let x represent the taxable income and y represent the tax.

Section C–Use if your filing status is **Married filing separately.** Complete the row below that applies to you.

Taxable income If line 43 is–	**(a)** Enter the amount from line 43	**(b)** Multiplication amount	**(c)** Multiply (a) by (b)	**(d)** Subtraction amount	**Tax** Subtract (d) from (c). Enter the result here and on Form 1040, line 44
At least $100,000 but not over $115,225	$	× 28% (0.28)	$	$6,474.25	$
Over $115,225 but not over $205,750	$	× 33% (0.33)	$	$12,235.50	$
Over $205,750 but not over $233,425	$	× 35% (0.35)	$	$16,350.50	$
Over $232,425	$	× 39.6% (0.396)	$	$27,042.05	$

a. Let Y1 represent the graphing calculator function for taxable incomes on the interval over $100,000 but not over $115,225. Write the calculator keystroke sequence for the equation that models the tax on this interval. Be sure to include the interval definition. $(0.28x - 6474.25)\ (x \geq 100000 \text{ and } x \leq 115225)$

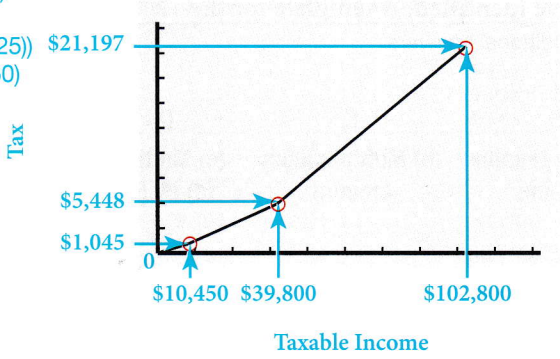
b. Let Y2 represent the graphing calculator function for taxable incomes on the interval "Over 232,425." Write the calculator keystroke sequence for the equation that models the tax on this interval. Be sure to include the interval definition. $(0.396x - 27042.05)\ (x > 232425)$

Schedule Y-2—If your filing status is **Married filing separately**

If your taxable income is		The tax is:	
Over—	*But not over—*		*of the amount over—*
$0	$9,225	..... 10%	$0
9,225	37,450	$922.50 + 15%	9,225
37,450	75,600	5,156.25 + 25%	37,450
75,600	115,225	14,693.75 + 28%	75,600
115,225	205,750	25,788.75 + 33%	115,225
205,750	232,425	55,662.00 + 35%	205,750
232,425	.....	64,998.25 + 39.6%	232,425

12a. $(5156.25 + 0.25(x - 37450))$
$(x > 37450 \text{ and } x \leq 75600)$

12b. $(25788.75 + 0.33(x - 115225))$
$(x > 115225 \text{ and } x \leq 205750)$



Schedule X—If your filing status is **Single**

If your taxable income is:		The tax is:	
Over—	*But not over—*		*of the amount over—*
$0	$9,225	..... 10%	$0
9,225	37,450	$922.50 + 15%	9,225
37,450	90,750	18,481.25 + 25%	37,450
90,750	189,300	18,481.25 + 28%	90,750
189,300	411,500	46,075.25 + 33%	189,300
411,500	413,200	119,401.25 + 35%	411,500
413,200	.....	119,996.25 + 39.6%	413,200

Schedule Y-1—If your filing status is **Married filing jointly** or **Qualifying widow(er)**

If your taxable income is:		The tax is:	
Over—	*But not over—*		*of the amount over—*
$0	$18,450	..... 10%	$0
18,450	74,900	$1,845.00 + 15%	18,450
74,900	151,200	10,312.50 + 25%	74,900
151,200	230,450	29,387.50 + 28%	151,200
230,450	411,500	51,577.50 + 33%	230,450
411,500	464,850	111,324.00 + 35%	411,500
464,850	.....	129,996.50 + 39.6%	464,850

12. Examine Schedule Y-2. Let x represent the taxable income and y represent the tax.

a. What is the calculator keystroke sequence for an equation that models the tax on the interval over 37,450 but not over 75,600? See margin.

b. What is the calculator keystroke sequence for an equation that models the tax on the interval over 115,225 but not over 205,750? See margin.

13. Use the graph of a piecewise function with three equations.

a. A taxpayer has a taxable income of $39,800. What is her tax? $5,448

b. A taxpayer will owe $21,197. What is his taxable income? $[illegible]

c. What is the approximate tax for an income of $30,000? $4,[illegible]

d. What is the approximate tax for an income of $99,000? $20,[illegible]

e. Nick is paid every other week. He has $390 taken out of each paycheck for federal taxes. What is his approximate taxable income? $[illegible]

14. Many people claim that once they are married, they pay more taxes than they did before they were married. Many call this a marriage penalty.

Suppose that Leni and Thom are lawyers and each has a taxable income of $230,000. They can't decide if they should be married in December or in January. If they marry in December, then they are considered married for the entire tax year and could file a joint return. If they get married in January of the next year, they would file a separate return each as a single taxpayer. Examine Schedules X and Y-1. Which filing status would yield the lower tax and by how much? Is there really a marriage penalty?

Married: Tax = $128,299; Single: Combined Tax = $119,012.50; Savings: $9,286.50