

Taxes Example with Piecewise-Defined Functions

1. Write the function for federal tax on taxable income for 2017 for a single person with annual taxable income between \$100,000 and \$416,700.
2. Write the function for federal tax withholding in 2018 for a single person with monthly salary between \$7183 and \$16,975.
3. Parts 1 and 2 are calculating two different amounts regarding taxes. Discuss the order of events in these two functions.
4. Is the first function continuous at 191,650?
5. How much is the 2017 tax on taxable income of \$108,000?
6. If a single person is paid \$9000 monthly, what total 2018 tax would be withheld for a year? Compare with previous answer.

2017 Tax Computation Worksheet—Line 44



See the instructions for line 44 to see if you must use the worksheet below to figure your tax.

Note. If you are required to use this worksheet to figure the tax on an amount from another form or worksheet, such as the Qualified Dividends and Capital Gain Tax Worksheet, the Schedule D Tax Worksheet, Schedule J, Form 8615, or the Foreign Earned Income Tax Worksheet, enter the amount from that form or worksheet in column (a) of the row that applies to the amount you are looking up. Enter the result on the appropriate line of the form or worksheet that you are completing.

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 \$191,650	\$	× 28% (0.28)	\$	\$ 7,018.25	\$
Over \$191,650 but not over \$416,700	\$	× 33% (0.33)	\$	\$ 16,600.75	\$
Over \$416,700 but not over \$418,400	\$	× 35% (0.35)	\$	\$ 24,934.75	\$
Over \$418,400	\$	× 39.6% (0.396)	\$	\$ 44,181.15	\$

Section B—Use if your filing status is **Married filing jointly** or **Qualifying widow(er)**. 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 \$153,100	\$	× 25% (0.25)	\$	\$ 8,522.50	\$
Over \$153,100 but not over \$233,350	\$	× 28% (0.28)	\$	\$ 13,115.50	\$
Over \$233,350 but not over \$416,700	\$	× 33% (0.33)	\$	\$ 24,783.00	\$
Over \$416,700 but not over \$470,700	\$	× 35% (0.35)	\$	\$ 33,117.00	\$
Over \$470,700	\$	× 39.6% (0.396)	\$	\$ 54,769.20	\$

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 \$116,675	\$	× 28% (0.28)	\$	\$ 6,557.75	\$
Over \$116,675 but not over \$208,350	\$	× 33% (0.33)	\$	\$ 12,391.50	\$
Over \$208,350 but not over \$235,350	\$	× 35% (0.35)	\$	\$ 16,558.50	\$
Over \$235,350	\$	× 39.6% (0.396)	\$	\$ 27,384.60	\$

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 \$131,200	\$	× 25% (0.25)	\$	\$ 5,747.50	\$
Over \$131,200 but not over \$212,500	\$	× 28% (0.28)	\$	\$ 9,683.50	\$
Over \$212,500 but not over \$416,700	\$	× 33% (0.33)	\$	\$ 20,308.50	\$
Over \$416,700 but not over \$444,550	\$	× 35% (0.35)	\$	\$ 28,642.50	\$
Over \$444,550	\$	× 39.6% (0.396)	\$	\$ 49,091.80	\$

Percentage Method Tables for Income Tax Withholding

(For Wages Paid in 2018)

TABLE 1—WEEKLY Payroll Period

(a) SINGLE person (including head of household)—				(b) MARRIED person —			
If the amount of wages (after subtracting withholding allowances) is:		The amount of income tax to withhold is:		If the amount of wages (after subtracting withholding allowances) is:		The amount of income tax to withhold is:	
Not over \$71		\$0		Not over \$222		\$0	
Over—	But not over—		of excess over—	Over—	But not over—		of excess over—
\$71	—\$254	\$0.00 plus 10%	—\$71	\$222	—\$588	\$0.00 plus 10%	—\$222
\$254	—\$815	\$18.30 plus 12%	—\$254	\$588	—\$1,711	\$36.60 plus 12%	—\$588
\$815	—\$1,658	\$85.62 plus 22%	—\$815	\$1,711	—\$3,395	\$171.36 plus 22%	—\$1,711
\$1,658	—\$3,100	\$271.08 plus 24%	—\$1,658	\$3,395	—\$6,280	\$541.84 plus 24%	—\$3,395
\$3,100	—\$3,917	\$617.16 plus 32%	—\$3,100	\$6,280	—\$7,914	\$1,234.24 plus 32%	—\$6,280
\$3,917	—\$9,687	\$878.60 plus 35%	—\$3,917	\$7,914	—\$11,761	\$1,757.12 plus 35%	—\$7,914
\$9,687		\$2,898.10 plus 37%	—\$9,687	\$11,761		\$3,103.57 plus 37%	—\$11,761

TABLE 2—BIWEEKLY Payroll Period

(a) SINGLE person (including head of household)—				(b) MARRIED person —			
If the amount of wages (after subtracting withholding allowances) is:		The amount of income tax to withhold is:		If the amount of wages (after subtracting withholding allowances) is:		The amount of income tax to withhold is:	
Not over \$142		\$0		Not over \$444		\$0	
Over—	But not over—		of excess over—	Over—	But not over—		of excess over—
\$142	—\$509	\$0.00 plus 10%	—\$142	\$444	—\$1,177	\$0.00 plus 10%	—\$444
\$509	—\$1,631	\$36.70 plus 12%	—\$509	\$1,177	—\$3,421	\$73.30 plus 12%	—\$1,177
\$1,631	—\$3,315	\$171.34 plus 22%	—\$1,631	\$3,421	—\$6,790	\$342.58 plus 22%	—\$3,421
\$3,315	—\$6,200	\$541.82 plus 24%	—\$3,315	\$6,790	—\$12,560	\$1,083.76 plus 24%	—\$6,790
\$6,200	—\$7,835	\$1,234.22 plus 32%	—\$6,200	\$12,560	—\$15,829	\$2,468.56 plus 32%	—\$12,560
\$7,835	—\$19,373	\$1,757.42 plus 35%	—\$7,835	\$15,829	—\$23,521	\$3,514.64 plus 35%	—\$15,829
\$19,373		\$5,795.72 plus 37%	—\$19,373	\$23,521		\$6,206.84 plus 37%	—\$23,521

TABLE 3—SEMI-MONTHLY Payroll Period

(a) SINGLE person (including head of household)—				(b) MARRIED person —			
If the amount of wages (after subtracting withholding allowances) is:		The amount of income tax to withhold is:		If the amount of wages (after subtracting withholding allowances) is:		The amount of income tax to withhold is:	
Not over \$154		\$0		Not over \$481		\$0	
Over—	But not over—		of excess over—	Over—	But not over—		of excess over—
\$154	—\$551	\$0.00 plus 10%	—\$154	\$481	—\$1,275	\$0.00 plus 10%	—\$481
\$551	—\$1,767	\$39.70 plus 12%	—\$551	\$1,275	—\$3,706	\$79.40 plus 12%	—\$1,275
\$1,767	—\$3,592	\$185.62 plus 22%	—\$1,767	\$3,706	—\$7,356	\$371.12 plus 22%	—\$3,706
\$3,592	—\$6,717	\$587.12 plus 24%	—\$3,592	\$7,356	—\$13,606	\$1,174.12 plus 24%	—\$7,356
\$6,717	—\$8,488	\$1,337.12 plus 32%	—\$6,717	\$13,606	—\$17,148	\$2,674.12 plus 32%	—\$13,606
\$8,488	—\$20,988	\$1,903.84 plus 35%	—\$8,488	\$17,148	—\$25,481	\$3,807.56 plus 35%	—\$17,148
\$20,988		\$6,278.84 plus 37%	—\$20,988	\$25,481		\$6,724.11 plus 37%	—\$25,481

TABLE 4—MONTHLY Payroll Period

(a) SINGLE person (including head of household)—				(b) MARRIED person —			
If the amount of wages (after subtracting withholding allowances) is:		The amount of income tax to withhold is:		If the amount of wages (after subtracting withholding allowances) is:		The amount of income tax to withhold is:	
Not over \$308		\$0		Not over \$963		\$0	
Over—	But not over—		of excess over—	Over—	But not over—		of excess over—
\$308	—\$1,102	\$0.00 plus 10%	—\$308	\$963	—\$2,550	\$0.00 plus 10%	—\$963
\$1,102	—\$3,533	\$79.40 plus 12%	—\$1,102	\$2,550	—\$7,413	\$158.70 plus 12%	—\$2,550
\$3,533	—\$7,183	\$371.12 plus 22%	—\$3,533	\$7,413	—\$14,713	\$742.26 plus 22%	—\$7,413
\$7,183	—\$13,433	\$1,174.12 plus 24%	—\$7,183	\$14,713	—\$27,213	\$2,348.26 plus 24%	—\$14,713
\$13,433	—\$16,975	\$2,674.12 plus 32%	—\$13,433	\$27,213	—\$34,296	\$5,348.26 plus 32%	—\$27,213
\$16,975	—\$41,975	\$3,807.56 plus 35%	—\$16,975	\$34,296	—\$50,963	\$7,614.82 plus 35%	—\$34,296
\$41,975		\$12,557.56 plus 37%	—\$41,975	\$50,963		\$13,448.27 plus 37%	—\$50,963

Answers
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Taxes Example with Piecewise-Defined Functions

1. Write the function for federal tax on taxable income for 2017 for a single person with annual taxable income between \$100,000 and \$416,700.

x = annual taxable income

$$\text{tax } T = \begin{cases} .28x - 7018.25 & \text{for } 100,000 < x < 191,650 \\ .33x - 16600.75 & \text{for } 191,650 < x < 416,700 \end{cases}$$

2. Write the function for federal tax withholding in 2018 for a single person with monthly salary between \$7183 and \$16,975.

x = amount of wages (monthly)

$$\text{withholding } W = \begin{cases} 1174.12 + .24(x - 7183) & 7183 < x < 13433 \\ 2674.17 + .32(x - 13433) & 13433 < x < 16975 \end{cases}$$

3. Parts 1 and 2 are calculating two different amounts regarding taxes. Discuss the order of events in these two functions.

① percentage first + then subtract

② percentage of a difference + then add

4. Is the first function continuous at 191,650?

yes

5. How much is the 2017 tax on taxable income of \$108,000?

$$.28(108000) - 7018.25 = 23221.75$$

6. If a single person is paid \$9000 monthly, what total 2018 tax would be withheld for a year? Compare with previous answer.

$$12 \left(1174.12 + .24(9000 - 7183) \right) = 19322.4$$

(1610.20)

Answer in 5 is larger.