

**Mathematical Concepts — Joysheet 2**  
**MAT 117, Fall 2022 — D. Ivanić**

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 Covers: 8.1-8.3 Show all your work!

1. (8pts) a) 52 is what percent of 196?

$$A = P \cdot B$$

$$52 = P \cdot 196$$

$$P = \frac{52}{196} = 0.265306 = 26.5306\%$$

b) 42% of what number is 20?

$$A = P \cdot B$$

$$20 = 0.42 \cdot B$$

$$B = \frac{20}{0.42} = 47.619048$$

2. (6pts) A dress was originally priced at \$149, but is now on sale at 30% off. What is the current price of the dress?

$$0.3 \cdot 149 = 44.7$$

$$149 - 44.7 = 104.30$$

↑  
current price

OR  
 current price is 70% of original,  
 so  $0.7 \cdot 149 = 104.30$

3. (13pts) Harriett, a single woman with two children, is filing a single tax return. She earned \$70,960 in wages and \$1,200 in interest; she deposited \$7000 into a retirement account; she paid \$5,100 in mortgage interest, \$1,800 in property taxes and \$3250 in state income taxes, and donated \$300 to charity.

a) Find Harriett's gross income and adjusted gross income.

b) Use the table 8.1 (2016 marginal tax rates, standard deductions and exemptions) on page 507 of our book to first determine Harriett's taxable income (don't forget the exemptions) and then find the tax on this income.

$$\text{Gross income} = 70,960 + 1,200 = \boxed{72,160}$$

$$\text{Adj. gross income} = 72,160 - 7,000 = \boxed{65,160}$$

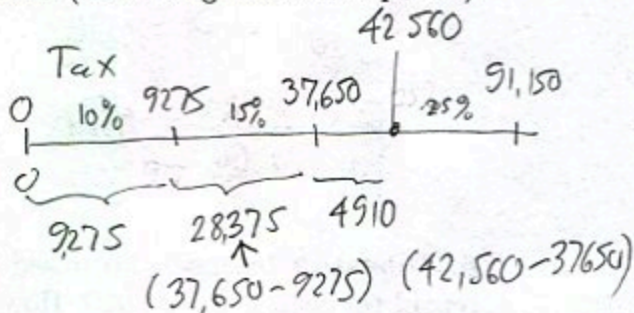
Itemized	5100	
deductions:	1800	
	3250	
	300	
	10,450	
		standard deduction 6,300

use this  $\swarrow$  exemptions ded

$$\text{Taxable income} = 65,160 - (3 \cdot 4,050 + 10,450)$$

← Harriett + 2 children

$$= \boxed{42,560}$$



$$\text{Tax} = 0.1 \cdot 9,275 + 0.15 \cdot 28,375 + 0.25 \cdot 4,910$$

$$= \boxed{6,411.25}$$



4. (13pts) You made a \$2,000 investment in 2019. During the first year, it increased in value by 25%. Then, during the next two years, it decreased in value by 18%. Overall, during the three years you held the investment, did the value increase or decrease, and by how many percent?

$$2000 \cdot 0.25 = 500$$

$$2000 + 500 = 2500 \leftarrow \text{after 1 year}$$

$$2500 \cdot 0.18 = 450$$

$$2500 - 450 = 2050 \leftarrow \text{after 2 years}$$

$$2050 - 2000 = 50$$

$$\frac{50}{2000} = 0.025, \text{ 2.5\% increase}$$

OR: Let  $P = 2000$

Value after 1 year is  $1.25P$

After 2 years it is  $0.82 \cdot 1.25P$

(value after 2 years is 82% of value after 1 year)

$$= 1.025P, \text{ which is a } 0.025P \text{ gain, or } 2.5\%$$

5. (10pts) How much money should you deposit in a simple-interest account bearing 4% if you would like to have \$5,000 in a year-and-a-half? How much of the final \$5,000 is from interest?

$$A = P(1 + rt)$$

Interest is

$$5000 = P(1 + 0.04 \cdot 1.5)$$

$$5000 - 4716.98$$

$$5000 = P \cdot 1.06$$

$$= 283.02$$

$$P = \frac{5000}{1.06} = 4716.98$$

6. (10pts) A business borrowed \$24,000 from a bank at 12% simple annual interest, and repaid the loan with \$31,920. How many months did the business hold this loan?

$$A = P(1 + rt)$$

$$31,920 = 24,000(1 + 0.12t) \quad | \div 24000$$

$$1.33 = 1 + 0.12t \quad | -1$$

$$0.33 = 0.12t$$

$$t = \frac{0.33}{0.12} = 2.75 \text{ years} = 24 + 9 \text{ months} = 33 \text{ months}$$