MA111 — Homework #7 Short Solutions

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1. (a) 5.2%
   (b) 4.7%
   (c) 9%
   (d) 4.825%
   (e) 19%
   (f) 8.74%
   (g) 35.6%
   (h) 3.89%
2. (a) 12%
   (b) 2814
   (c) 31.25
   (d) 80
   (e) 666.67%
   (f) 6000
   (g) 95357.44
   (h) 8.33%
   (i) 2
3. 360
5. 19,469,475
6. (a) 159.7%
   (b) 62.6%
   (c) 59.7%
7. 20%
9. 500
10. $3.51

2. Case Study 2.1

1. **Massery**: \$6 per thousand and \$3.77 per thousand.

   Pierce: \$1 per \$6 and \$1 per \$3.7.

   Stilley does not state the rates.

   Basinger: \$166.67 per \$1000 and \$265 per \$1000.

   McGuire re-computes the taxes and states the rates of his computed taxes (\$3,754 on \$30,000 and \$56,748 on \$200,000) as \$125 per \$1,000 and \$284 per \$1,000.

   Herrington: \$166.67 per \$1,000 and \$265 per \$1,000. **Herrington**: 16.7 percent and 26.5 percent.

   VanHook: 16.67 percent and 26.5 percent. **VanHook** restates Massery's \$6 per \$1,000 as .06 percent.

2 and 4. We will compute the tax rates:

\$5000 in taxes on \$30,000 income:

$$\frac{5000}{30000} \approx 0.16667 \approx 16.7\%.$$

\$53,000 in taxes on \$200,000 income:

$$\frac{53000}{200000} = 0.265 = 26.5\%.$$

So Herrington and VanHook are correct in stating the percentages.

Now convert these tax rates to an amount per thousand dollars:

\$5000 in taxes on \$30,000 income:

$$\begin{aligned} 0.1667 &= \frac{x}{1000} \\ 0.1667 \cdot 1000 &= 166.67 = x. \end{aligned}$$

So this tax rate is equivalent to \$166.67 per \$1000.

\$53,000 in taxes on \$200,000 income:

$$\begin{aligned} 0.265 &= \frac{x}{1000} \\ 265 &= x. \end{aligned}$$

So this tax rate is equivalent to \$265 per \$1000.

Massery is incorrect. Basinger and Herrington are correct.

To see that Pierce is correct, we compute:

For \$5000 in taxes on \$30,000 income:

$$\begin{aligned} \frac{5000}{30000} &= \frac{1}{x} \\ 5000 \cdot x &= 30000 \\ x &= 6. \end{aligned}$$

For \$53,000 in taxes on \$200,000 income:

$$\begin{aligned} \frac{53000}{200000} &= \frac{1}{x} \\ 53000 \cdot x &= 200000 \\ x &= 3.77. \end{aligned}$$

VanHook restates Massery's \$6 per \$1,000 as 0.06 percent, and then says that at 0.06%, he should have paid \$150 on \$30,000 income.

Let's check:

$$\begin{aligned} \frac{6}{1000} &= \frac{P}{100} \\ 6 \cdot 100 &= P \cdot 1000 \\ 0.6 &= P \end{aligned}$$

The actual rate would be 0.6%.

At this rate, what amount would be paid on \$30,000?

$$\$30000 \cdot \frac{0.6}{100} = \$180.$$

3. As Pierce points out, it is likely that Massery's "numerators and denominators are mixed up." Note that $\frac{\$30000}{\$5000} = 6$ and $\frac{\$200000}{\$53000} = 3.77$.

3. Case Study 2

3. From the article: "... \$1 billion per month. . . . it's only about half of 1 percent of the federal budget." This implies that \$12 billion per year is 0.5% of the federal budget. Let F be the amount of the federal budget. Then

$$\frac{0.5}{100} = \frac{\$12 \text{ billion}}{F}.$$

So $F = \frac{100 \times \$12 \text{ billion}}{0.5} = \$2400$ billion, which is \$2.4 trillion.

4. From the article: "...create 170,000 jobs next year. That would add...0.13 percent to employment in this country. Let E be the number of people employed.

$$\frac{0.13}{100} = \frac{170000}{E},$$

so $E = \frac{100 \times 170000}{0.13} = 130,769,230$ or about 131 million.

4. Salary decrease and increase.

You are making \$12 an hour. Due to the recession, your boss cuts your pay by 10%. One year later things are picking up, and your boss says he is now going to increase your salary by 10%. Will you be making \$12 an hour again?

Answer: When your pay is cut by 10%, your new pay is $\$12(1 - \frac{10}{100})$ or \$10.80 per hour. When your pay is then increased by 10%, your new pay is $\$10.80(1 + \frac{10}{100})$ or \$11.88 per hour, which is *not* back to \$12 per hour.