Math 101, Littlefield

Key for Homework "Solving Equations (Second Set, With Spreadsheet Checks)"

Part A. Symbolically solve the following equations. For problems 4-8, show at least 2 intermediate steps in the solution process.

1. $d = rt$ for r (distance/rate/time)

$$r = \frac{d}{t}$$

2. $A = bh$ for h (area of a parallelogram)

$$h = \frac{A}{b}$$

3. $A = \frac{1}{2}bh$ for b (area of a triangle)

$$b = \frac{2A}{h}$$

4. $S = 2\pi rL + 4\pi r^2$ for L (surface area of a propane tank having cylindrical length L)

$$S - 4\pi r^2 = 2\pi rL$$

$$\frac{S - 4\pi r^2}{2\pi r} = \frac{2\pi rL}{2\pi r}$$

$$L = \frac{S - 4\pi r^2}{2\pi r} = \frac{S}{2\pi r} - 2r$$

5. $A = \frac{1}{2}h(b + B)$ for b (area of a trapezoid)

$$2A = h(b + B)$$

$$2A = hb + hB$$

$$2A - hB = hb$$

$$b = \frac{2A - hB}{h} = \frac{2A}{h} - B$$

6. $r = \dfrac{4.3 - AiR}{i}$　　　　　　　for i　(electronics)

$ir = 4.3 - AiR$

$ir + AiR = 4.3$

$(r + AR)i = 4.3$

$\dfrac{(r + AR)i}{(r + AR)i} = \dfrac{4.3}{(r + AR)}$

$i = \dfrac{4.3}{r + AR}$

7. $\dfrac{1}{f} = \dfrac{1}{o} + \dfrac{1}{i}$　　　　　　　for i　(photography)

$foi \cdot \left(\dfrac{1}{f}\right) = foi \cdot \left(\dfrac{1}{o} + \dfrac{1}{i}\right)$

$\dfrac{foi}{f} = \dfrac{foi}{o} + \dfrac{foi}{i}$

$oi = fi + fo$

$oi - fi = fo$

$(o - f) \cdot i = fo$

$i = \dfrac{fo}{o - f}$

Part B. Construct an Excel spreadsheet to check that at least three of your symbolic solutions are correct. You can pick any three you like. Doing more than three gets extra credit.

Provide two printouts — one showing values, one showing formulas.

Spreadsheet — view 1 (formulas)

	A	B	C	D	E
1	**Problem 3**				
2	Variables	A	b	h	
3	Values	17.5	5	7	
4					
5	Equations	Left Side	Right Side	Difference	
6	A = (1/2)bh	=B3	=(1/2)*C3*D3	=B6-C6	
7	b = (2A)/h	=C3	=(2*B3)/D3	=B7-C7	
8					
9	I tested also with:	A	b	h	
10		35	7	10	
11		43.5	3	29	
12		17.5	5	7	
13					
14	**Problem 6.**				
15	Variables	r	A	i	R
16	Values	-16	7.5	0.2	5
17					
18	Equations	Left Side	Right Side	Difference	
19	r = (4.3-AiR)/i	=B16	=(4.3-C16*D16*E16)/D16	=B19-C19	
20	i = 4.3/(r+AR)	=D16	=4.3/(B16+C16*E16)	=B20-C20	
21					
22	I tested also with:	r	A	i	R
23		-831.56666666667	49	3	17
24		-543.75714285714	13	0.7	42.3
25		-16	7.5	0.2	5
26					
27	**Problem 7**				
28	Variables	f	o	i	
29	Values	1.96078431372549	2	100	
30					
31	Equations	Left Side	Right Side	Difference	
32	1/f = 1/o + 1/i	=1/B29	=1/C29+1/D29	=B32-C32	
33	i = (fo)/(o-f)	=D29	=(B29*C29)/(C29-B29)	=B33-C33	
34					
35	I tested also with:	f	o	i	
36		2.91666666666667	5	7	
37		2.4	12	3	
38		1.96078431372549	2	100	

Spreadsheet — view 2 (values)

	A	B	C	D	E
1	**Problem 3**				
2	Variables	A	b	h	
3	Values	17.5	5	7	
4					
5	Equations	Left Side	Right Side	Difference	
6	A = (1/2)bh	17.5	17.5	0	
7	b = (2A)/h	5	5	0	
8					
9	I tested also with:	A	b	h	
10		35	7	10	
11		43.5	3	29	
12		17.5	5	7	
13					
14	**Problem 6.**				
15	Variables	r	A	i	R
16	Values	-16	7.5	0.2	5
17					
18	Equations	Left Side	Right Side	Difference	
19	r = (4.3-AiR)/i	-16	-16	0	
20	i = 4.3/(r+AR)	0.2	0.2	0	
21					
22	I tested also with:	r	A	i	R
23		-831.5667	49	3	17
24		-543.7571	13	0.7	42.3
25		-16	7.5	0.2	5
26					
27	**Problem 7**				
28	Variables	f	o	i	
29	Values	1.9607843	2	100	
30					
31	Equations	Left Side	Right Side	Difference	
32	1/f = 1/o + 1/i	0.51	0.51	0	
33	i = (fo)/(o-f)	100	100	-3.7E-13	
34					
35	I tested also with:	f	o	i	
36		2.9166667	5	7	
37		2.4	12	3	
38		1.9607843	2	100	