

Reasoning and Proof – Algebraic Proofs

Hw Section 2.2

Name _____

Support each conclusion with a valid reason.

1. Given: $x - 42 = 12$

Conclusion: $x = 54$

Addition PoE for \mathbb{R}

2. Given: $23(2 + x) = 230$

Conclusion: $2 + x = 10$

Div'n PoE for \mathbb{R}

3. Given: $3x - 7x = 20$

Conclusion: $-4x = 20$

Substitution PoE for \mathbb{R}

4. Given: $-x = 34$

Conclusion: $x = -34$

Mult PoE for \mathbb{R}

5. If $12 = d$ and $d = x$,
then $12 = x$.

Transitive PoE for \mathbb{R}

6. $GH = GH$

Reflexive PoE for \mathbb{R}

Fill in the missing statements or reasons for the following two-column proof.

Given: $4x - 20 = 100$

Prove: $x = 30$

Proof #1

Statement	Reason
1. $4x - 20 = 100$	1. <i>Given</i>
2. $4x = 120$	2. <i>Add'n PoE for \mathbb{R}</i>
3. $x = 30$	3. <i>Div'n PoE for \mathbb{R}</i>

Given: $12 - x = 10$

Prove: $x = 2$

Proof #2

Statement	Reason
1. $12 - x = 10$	1. <i>GIVEN PoE for \mathbb{R}</i>
2. $-x = -2$	2. <i>Subtr. PoE for \mathbb{R}</i>
3. $x = 2$	3. <i>Div'n PoE for \mathbb{R}</i>

Given: $5x + 20 = 20 + -2x$

Prove: $x = 0$

Proof #3

Statement	Reason
1. $5x + 20 = 20 + -2x$	1. <i>GIVEN</i>
2. $5x = -2x$	2. <i>Subtr. PoE for \mathbb{R}</i>
3. $7x = 0$	3. <i>Add'n PoE for \mathbb{R}</i>
4. $x = 0$	4. <i>Div'n PoE for \mathbb{R}</i>

Given: $12 - x = 10$

Prove: $x = 2$

Proof #4

Statement	Reason
1. $12 - x = 10$	1. <i>GIVEN</i>
2. $12 = 10 + x$	2. <i>Add'n PoE for \mathbb{R}</i>
3. $2 = x$	3. <i>Subtr. PoE for \mathbb{R}</i>
4. $x = 2$	4. <i>Symmetric PoE for \mathbb{R}</i>

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Proof #5.

Given: $10 - 3(4x - 2) + 1 = 77$

Prove: $x = -5$

Statement	Reason
1. $10 - 3(4x - 2) + 1 = 77$	1. GIVEN
2. $-3(4x - 2) + 1 = 67$	2. Subtr. PoE for \mathbb{R}
3. $-3(4x - 2) = 66$	3. Subtr. PoE for \mathbb{R}
4. $-12x + 6 = 66$	4. Dist. PoE for \mathbb{R}
5. $-12x = 60$	5. Subtr. PoE for \mathbb{R}
6. $x = -5$	6. Div'n PoE for \mathbb{R}

Proof #6.

Prove that if $\frac{8}{3}x + \frac{1}{3} = \frac{11}{3}x - \frac{2}{3}$, then $x = 1$.

Given: $\frac{8}{3}x + \frac{1}{3} = \frac{11}{3}x - \frac{2}{3}$

Prove: $x = 1$

Statement

Reason

a. $\frac{8}{3}x + \frac{1}{3} = \frac{11}{3}x - \frac{2}{3}$	a. GIVEN
b. $8x + 1 = 11x - 2$	b. Mult PoE for \mathbb{R}
c. $1 = 3x - 2$	c. Subtr'n PoE for \mathbb{R}
d. $3 = 3x$	d. Add'n PoE for \mathbb{R}
e. $1 = x$	e. Div'n PoE for \mathbb{R}
f. $x = 1$	f. Symmetric PoE for \mathbb{R}