

Linear Systems: Solving by Substitution

Date _____

Solve the following systems using SUBSTITUTION ...

<p>a) $3x - y = 4$ ① $y = 8 - x$ ②</p> <p>Sub ② into ①</p> $3x - (8 - x) = 4$ $3x - 8 + x = 4$ $4x = 4 + 8$ $4x = 12$ $\frac{4x}{4} = \frac{12}{4}$ $\boxed{x = 3}$ <p>Sub $x = 3$ into ②</p> $y = 8 - x$ $y = 8 - 3$ $\boxed{y = 5}$ <p>\therefore POI is $(3, 5)$</p> <div style="float: right; text-align: right;"> <p>check ①</p> <table style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>LS</th> <th>RS</th> </tr> </thead> <tbody> <tr> <td>$3x - y$</td> <td>$= 4$ ✓</td> </tr> <tr> <td>$= 3(3) - 5$</td> <td></td> </tr> <tr> <td>$= 9 - 5$</td> <td></td> </tr> <tr> <td>$= 4$ ✓</td> <td></td> </tr> </tbody> </table> <p>check ②</p> <table style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>LS</th> <th>RS</th> </tr> </thead> <tbody> <tr> <td>y</td> <td>$= 8 - x$</td> </tr> <tr> <td>$= 5$ ✓</td> <td>$= 8 - 3$</td> </tr> <tr> <td></td> <td>$= 5$ ✓</td> </tr> </tbody> </table> </div>	LS	RS	$3x - y$	$= 4$ ✓	$= 3(3) - 5$		$= 9 - 5$		$= 4$ ✓		LS	RS	y	$= 8 - x$	$= 5$ ✓	$= 8 - 3$		$= 5$ ✓	<p>b) $y = 3x - 5$ ① $4x - 3y = 0$ ②</p> <p>Sub ① into ②</p> $4x - 3(3x - 5) = 0$ $4x - 9x + 15 = 0$ $-5x + 15 = 0$ $15 = 5x$ $\frac{15}{5} = \frac{5x}{5}$ $\boxed{3 = x}$ <p>Sub $x = 3$ into ①</p> $y = 3(3) - 5$ $y = 9 - 5$ $\boxed{y = 4}$ <p>\therefore POI is $(3, 4)$</p> <div style="float: right; text-align: right;"> <p>check ①</p> <table style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>LS</th> <th>RS</th> </tr> </thead> <tbody> <tr> <td>$4x - 3y$</td> <td>$= 0$</td> </tr> <tr> <td>$= 4$ ✓</td> <td>$= 3(3) - 5$</td> </tr> <tr> <td></td> <td>$= 9 - 5$</td> </tr> <tr> <td></td> <td>$= 4$ ✓</td> </tr> </tbody> </table> <p>check ②</p> <table style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>LS</th> <th>RS</th> </tr> </thead> <tbody> <tr> <td>$4x - 3y$</td> <td>$= 0$ ✓</td> </tr> <tr> <td>$= 4(3) - 3(4)$</td> <td></td> </tr> <tr> <td>$= 12 - 12$</td> <td></td> </tr> <tr> <td>$= 0$ ✓</td> <td></td> </tr> </tbody> </table> </div>	LS	RS	$4x - 3y$	$= 0$	$= 4$ ✓	$= 3(3) - 5$		$= 9 - 5$		$= 4$ ✓	LS	RS	$4x - 3y$	$= 0$ ✓	$= 4(3) - 3(4)$		$= 12 - 12$		$= 0$ ✓			
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<p>c) $x = 5 + 3y$ ① $7x + 2y = 12$ ②</p> <p>Sub ① into ②</p> $7(5 + 3y) + 2y = 12$ $35 + 21y + 2y = 12$ $23y = 12 - 35$ $23y = -23$ $\frac{23y}{23} = \frac{-23}{23}$ $\boxed{y = -1}$ <p>Sub $y = -1$ into ①</p> $x = 5 + 3(-1)$ $x = 5 - 3$ $\boxed{x = 2}$ <p>\therefore POI is $(2, -1)$</p> <div style="float: right; text-align: right;"> <p>check ①</p> <table style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>LS</th> <th>RS</th> </tr> </thead> <tbody> <tr> <td>x</td> <td>$= 5 + 3y$</td> </tr> <tr> <td>$= 2$ ✓</td> <td>$= 5 + 3(-1)$</td> </tr> <tr> <td></td> <td>$= 5 - 3$</td> </tr> <tr> <td></td> <td>$= 2$ ✓</td> </tr> </tbody> </table> <p>check ②</p> <table style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>LS</th> <th>RS</th> </tr> </thead> <tbody> <tr> <td>$7x + 2y$</td> <td>$= 12$ ✓</td> </tr> <tr> <td>$= 7(2) + 2(-1)$</td> <td></td> </tr> <tr> <td>$= 14 - 2$</td> <td></td> </tr> <tr> <td>$= 12$ ✓</td> <td></td> </tr> </tbody> </table> </div>	LS	RS	x	$= 5 + 3y$	$= 2$ ✓	$= 5 + 3(-1)$		$= 5 - 3$		$= 2$ ✓	LS	RS	$7x + 2y$	$= 12$ ✓	$= 7(2) + 2(-1)$		$= 14 - 2$		$= 12$ ✓		<p>d) $5x + 3y = 7$ ① $x = 2y + 4$ ②</p> <p>Sub ② into ①</p> $5(2y + 4) + 3y = 7$ $10y + 20 + 3y = 7$ $13y = 7 - 20$ $13y = -13$ $\frac{13y}{13} = \frac{-13}{13}$ $\boxed{y = -1}$ <p>Sub $y = -1$ into ②</p> $x = 2(-1) + 4$ $x = -2 + 4$ $\boxed{x = 2}$ <p>\therefore POI is $(2, -1)$</p> <div style="float: right; text-align: right;"> <p>check ①</p> <table style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>LS</th> <th>RS</th> </tr> </thead> <tbody> <tr> <td>$5x + 3y$</td> <td>$= 7$ ✓</td> </tr> <tr> <td>$= 5(2) + 3(-1)$</td> <td></td> </tr> <tr> <td>$= 10 - 3$</td> <td></td> </tr> <tr> <td>$= 7$ ✓</td> <td></td> </tr> </tbody> </table> <p>check ②</p> <table style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>LS</th> <th>RS</th> </tr> </thead> <tbody> <tr> <td>x</td> <td>$= 2y + 4$</td> </tr> <tr> <td>$= 2$ ✓</td> <td>$= 2(-1) + 4$</td> </tr> <tr> <td></td> <td>$= -2 + 4$</td> </tr> <tr> <td></td> <td>$= 2$ ✓</td> </tr> </tbody> </table> </div>	LS	RS	$5x + 3y$	$= 7$ ✓	$= 5(2) + 3(-1)$		$= 10 - 3$		$= 7$ ✓		LS	RS	x	$= 2y + 4$	$= 2$ ✓	$= 2(-1) + 4$		$= -2 + 4$		$= 2$ ✓
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