

Factor Completely.

1)  $2x^2 - 14x - 36$   
 $2(x^2 - 7x - 18)$   
 $2(x-9)(x+2)$

2)  $x^2 + 9xy + 14y^2$   
 $(x+7y)(x+2y)$

3)  $x^4 - 9x^2 + 8$   
 $(x^2-8)(x^2-1)$   
 $(x^2-8)(x+1)(x-1)$

4)  $3x^2 + 48x$   
 $3x(x+16)$

5)  $10x^2 + 3x - 4$   
 $(10x+8)(x-5)$   
 $2(5x+4)(x-1)$   
 $(5x+4)(x-1)$

6)  $9x^2 + 12xy + 4y^2$   
 $(9x+6y)(x+2y)$   
 $3(3x+2y)(x+2y)$   
 $(3x+2y)(3x+2y)$

7)  $x^3 + x^2 - 16x - 16$   
 $x^2(x+1) - 16(x+1)$   
 $(x+1)(x^2-16)$   
 $(x+1)(x+4)(x-4)$

8)  $x^3 - 4xy^2 - 2x^2 + 8y^2$   
 $x(x^2 - 4y^2) - 2x(x - 4y^2)$   
 $(x^2 - 4y^2)(x-2)$   
 $(x+2y)(x-2y)(x-2)$

9)  $25x^2 + 100xy + 100y^2$   
 $25(x^2 + 4xy + 4y^2)$   
 $25(x+2y)(x+2y)$

10)  $3x^4 - 6x^3 - 24x^2$   
 $3x^2(x^2 - 2x - 8)$   
 $3x^2(x-4)(x+2)$

Solve for all values of x:

11)  $3x^3 - 5x^2 - 2x = 0$   
 $x(3x^2 - 5x - 2) = 0$   
 $x(3x+1)(x-2) = 0$   

$x=0$	$x=2$	$x=-\frac{1}{3}$
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13)  $2x^2 = 18$   
 $\frac{2x^2}{2} = \frac{18}{2}$   
 $x^2 - 9 = 0$   
 $(x+3)(x-3) = 0$   

$x=-3$	$x=3$
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15)  $3x^2 = 16x - 5$   
 $3x^2 - 16x + 5 = 0$   
 $(3x-15)(3x-1) = 0$   

$x=5$	$x=\frac{1}{3}$
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12)  $x^2 - 2x + 63$   
 $(x+9)(x-7) = 0$   

$x=-9$	$x=7$
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14)  $2x^2 + 6x = 20$   
 $\frac{2x^2 + 6x}{2} = \frac{20}{2}$   
 $x^2 + 3x - 10 = 0$   
 $(x+5)(x-2) = 0$   

$x=-5$	$x=2$
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16)  $x^3 - 3x^2 + 12 = 4x$   
 $x^3 - 3x^2 - 4x + 12 = 0$   
 $x^2(x-3) - 4(x-3) = 0$   
 $(x^2-4)(x-3) = 0$   
 $(x+2)(x-2)(x-3) = 0$   

$x=-2$	$x=2$	$x=3$
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17)  $10x^3 + 45x^2 = 10x^2 - 15x$   
 $10x^3 + 35x^2 + 15x = 0$   
 $5x(2x^2 + 7x + 3) = 0$   
 $5x(2x+5)(x+1) = 0$   

$x=0$	$x=-\frac{5}{2}$	$x=-1$
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18)  $x^3 - x = 0$   
 $x(x^2 - 1) = 0$   
 $x(x+1)(x-1) = 0$   

$x=0$	$x=-1$	$x=1$
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Solve the system algebraically:

19)  $y = x^2 + 2x + 1$   
 $y = 2x + 5$

$$\begin{array}{r} x^2 + 2x + 1 = 2x + 5 \\ -2x - 5 \quad -2x - 5 \\ \hline \end{array}$$

$$x^2 - 4 = 0$$

$$(x+2)(x-2) = 0$$

$$x = -2 \quad x = 2$$

$$y = 2(-2) + 5$$

$$y = 1$$

$(-2, 1)$	$(2, 9)$
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20)  $y = x^2 + 2$   
 $y - 4 = x$

$$x^2 + 2 - 4 = x$$

$$\begin{array}{r} x^2 - 2 = x \\ -x \quad -x \\ \hline \end{array}$$

$$x^2 - x - 2 = 0$$

$$(x-2)(x+1) = 0$$

$$x = 2 \quad x = -1$$

$$y = (2)^2 + 2$$

$$y = 6$$

$(2, 6)$	$(-1, 3)$
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21)  $x^2 - 12 = y$   
 $y = 7x + 18$

$$\begin{array}{r} x^2 - 12 = 7x + 18 \\ -7x - 18 \quad -7x - 18 \\ \hline \end{array}$$

$$x^2 - 7x - 30 = 0$$

$$(x-10)(x+3) = 0$$

$$x = 10 \quad x = -3$$

$$y = 7(10) + 18$$

$$y = 88$$

$(10, 88)$	$(-3, -3)$
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22)  $x^2 + 25 = y + 7x$   
 $y + 35 = 9x$   
 $-35 \quad -35$   
 $y = 9x - 35$

$$\begin{array}{r} x^2 + 25 = 9x - 35 + 7x \\ x^2 + 25 = 16x - 35 \\ -16x + 35 \quad -16x + 35 \\ \hline \end{array}$$

$$x^2 - 16x + 60 = 0$$

$$(x-10)(x-6) = 0$$

$$x = 10 \quad x = 6$$

$$y = 9(10) - 35$$

$$y = 55$$

$(10, 55)$	$(6, 19)$
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