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MATH 100

Fall 2021

HW 10: Due 11/08

*“Thankfully, perseverance is a great  
substitute for talent.”*

*— Steve Martin*

**Problem 1.** (10pt) Factor  $x^2 + 2x - 24$ . Show all your work.

**Solution.**

24

$$1 \cdot -24: \quad -23$$

$$-1 \cdot 24: \quad 23$$

$$2 \cdot -12: \quad -10$$

$$-2 \cdot 12: \quad 10$$

$$3 \cdot -8: \quad -5$$

$$-3 \cdot 8: \quad 5$$

$$4 \cdot -6: \quad -2$$

$-4 \cdot 6: \quad 2$
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Therefore,

$$x^2 + 2x - 24 = (x - 4)(x + 6)$$

**Problem 2.** (10pt) Factor  $x^2 + 4x - 32$ . Show all your work.

**Solution.**

**32**

$$1 \cdot -32: \quad -31$$

$$-1 \cdot 32: \quad 31$$

$$2 \cdot -16: \quad -14$$

$$-2 \cdot 16: \quad 14$$

$$4 \cdot -8: \quad -4$$

$-4 \cdot 8:$	$4$
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Therefore,

$$x^2 + 4x - 32 = (x - 4)(x + 8)$$

**Problem 3.** (10pt) Factor  $x^2 + 4x$ . Show all your work.

**Solution.** This quadratic expression factors as...

$$x^2 + 4x = x(x + 4)$$

**Problem 4.** (10pt) Factor  $x^2 + 17x - 18$ . Show all your work.

**Solution.**

$$\begin{array}{r} \underline{18} \\ 1 \cdot -18: \quad -17 \\ \boxed{-1 \cdot 18: \quad 17} \\ 2 \cdot -9: \quad -7 \\ -2 \cdot 9: \quad 7 \\ 3 \cdot -6: \quad -3 \\ -3 \cdot 6: \quad 3 \end{array}$$

Therefore,

$$x^2 + 17x - 18 = (x - 1)(x + 18)$$

**Problem 5.** (10pt) Factor  $2x^2 - 11x + 15$ . Show all your work.

**Solution.**

$$\begin{array}{c} \underline{15} \\ 1 \cdot 15 \\ -1 \cdot -15 \\ 3 \cdot 5 \\ -3 \cdot -5 \end{array}$$

Then as  $2 = 1 \cdot 2$ , we have...

$$\begin{array}{cc} \begin{array}{c} 1 \cdot 15 \\ 1, 2 \quad 2, 1 \\ \swarrow \quad \searrow \\ 1, 30 \quad 2, 15 \end{array} & \begin{array}{c} -1 \cdot -15 \\ 1, 2 \quad 2, 1 \\ \swarrow \quad \searrow \\ -1, -30 \quad -2, -15 \end{array} \\ \\ \begin{array}{c} 3 \cdot 5 \\ 1, 2 \quad 2, 1 \\ \swarrow \quad \searrow \\ 3, 10 \quad 6, 5 \end{array} & \begin{array}{c} \boxed{-3 \cdot -5} \\ 1, 2 \quad 2, 1 \\ \swarrow \quad \searrow \\ -3, -10 \quad \boxed{-6, -5} \end{array} \end{array}$$

Therefore,

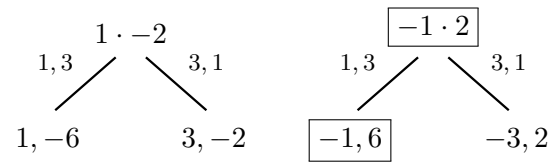
$$2x^2 - 11x + 15 = (2x - 5)(x - 3)$$

**Problem 6.** (10pt) Factor  $3x^2 + 5x - 2$ . Show all your work.

**Solution.**

$$\begin{array}{c} \underline{2} \\ 1 \cdot -2 \\ -1 \cdot 2 \end{array}$$

Then as  $3 = 1 \cdot 3$ , we have...



Therefore,

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

**Problem 7.** (10pt) Factor  $x^2 - 6x + 9$ . Show all your work.

**Solution.**

$$\begin{array}{r} \underline{9} \\ 1 \cdot 9: \quad 10 \\ -1 \cdot -9: \quad -10 \\ 3 \cdot 3: \quad 6 \\ \boxed{-3 \cdot -3: \quad -6} \end{array}$$

Therefore,

$$x^2 - 6x + 9 = (x - 3)(x - 3) = (x - 3)^2$$

**Problem 8.** (10pt) Factor  $x^2 + 10x + 16$ . Show all your work.

**Solution.**

<u>16</u>	
$1 \cdot 16:$	17
$-1 \cdot -16:$	-17
$2 \cdot 8:$	10
$-2 \cdot -8:$	-10
$4 \cdot 4:$	8
$-4 \cdot -4:$	-8

Therefore,

$$x^2 + 10x + 16 = (x + 2)(x + 8)$$



**Problem 9.** (10pt) Factor  $4x^2 - 4x - 3$ . Show all your work.

**Solution.**

$$\begin{array}{c} \underline{3} \\ 1 \cdot -3 \\ -1 \cdot 3 \end{array}$$

Then as  $4 = 1 \cdot 4$  or  $4 = 2 \cdot 2$ , we have...

$$\begin{array}{cc} \begin{array}{c} 1, -12 \qquad 4, -3 \\ \swarrow \quad \searrow \\ 1, 4 \qquad 4, 1 \\ \boxed{1 \cdot -3} \\ 2, 2 \downarrow \\ \boxed{2, -6} \end{array} & \begin{array}{c} -1, 12 \qquad -4, 3 \\ \swarrow \quad \searrow \\ 1, 4 \qquad 4, 1 \\ -1 \cdot 3 \\ 2, 2 \downarrow \\ -2, 6 \end{array} \end{array}$$

Therefore,

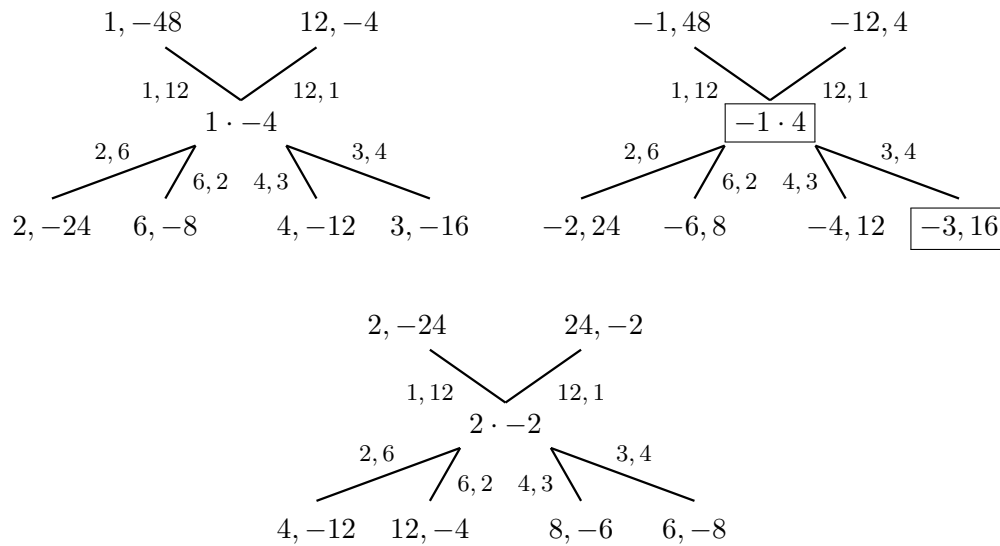
$$4x^2 - 4x - 3 = (2x - 3)(2x + 1)$$

**Problem 10.** (10pt) Factor  $12x^2 + 13x - 4$ . Show all your work.

**Solution.**

$$\begin{array}{c} \underline{4} \\ 1 \cdot -4 \\ -1 \cdot 4 \\ 2 \cdot -2 \end{array}$$

Then as  $12 = 1 \cdot 12$ ,  $12 = 2 \cdot 6$ , or  $12 = 3 \cdot 4$ , we have...



Therefore,

$$12x^2 + 13x - 4 = (3x + 4)(4x - 1)$$