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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** | |
|---|---|
| $1 \cdot -24:$ | $-23$ |
| $-1 \cdot 24:$ | $23$ |
| $2 \cdot -12:$ | $-10$ |
| $-2 \cdot 12:$ | $10$ |
| $3 \cdot -8:$ | $-5$ |
| $-3 \cdot 8:$ | $5$ |
| $4 \cdot -6:$ | $-2$ |
| $-4 \cdot 6:$ | $2$ |

Therefore,

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

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

**Solution.**

| $\underline{\mathbf{32}}$ | |
|---|---|
| $1 \cdot -32:$ | $-31$ |
| $-1 \cdot 32:$ | $31$ |
| $2 \cdot -16:$ | $-14$ |
| $-2 \cdot 16:$ | $14$ |
| $4 \cdot -8:$ | $-4$ |
| $\boxed{-4 \cdot 8:}$ | $\boxed{4}$ |

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.**

| $\underline{\mathbf{18}}$ | |
|---|---|
| $1 \cdot -18:$ | $-17$ |
| $\boxed{-1 \cdot 18:}$ | $\boxed{17}$ |
| $2 \cdot -9:$ | $-7$ |
| $-2 \cdot 9:$ | $7$ |
| $3 \cdot -6:$ | $-3$ |
| $-3 \cdot 6:$ | $3$ |

Therefore,

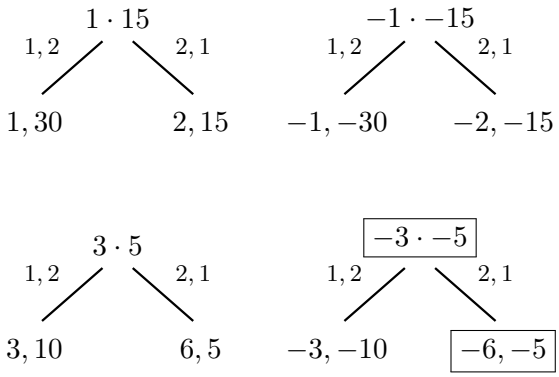
$$x^2 + 17x - 18 = (x - 1)(x + 18)$$

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

**Solution.**

$$\underline{\mathbf{15}}$$
$$1 \cdot 15$$
$$-1 \cdot -15$$
$$3 \cdot 5$$
$$-3 \cdot -5$$

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




Therefore,

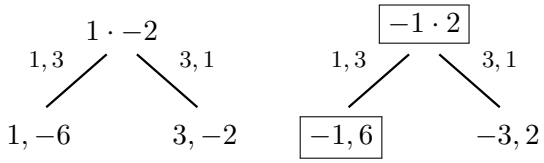
$$2x^2 - 11x + 15 = (2x - 5)(x - 3)$$

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

**Solution.**

$$\underline{\mathbf{2}}$$
$$1 \cdot -2$$
$$-1 \cdot 2$$

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.**

| $\underline{9}$ | |
|---|---|
| $1 \cdot 9$: | $10$ |
| $-1 \cdot -9$: | $-10$ |
| $3 \cdot 3$: | $6$ |
| $\boxed{-3 \cdot -3}$: | $\boxed{-6}$ |

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.**

| $\underline{\mathbf{16}}$ | |
|---|---|
| $1 \cdot 16$: | $17$ |
| $-1 \cdot -16$: | $-17$ |
| $\boxed{2 \cdot 8}$: | $\boxed{10}$ |
| $-2 \cdot -8$: | $-10$ |
| $4 \cdot 4$: | $8$ |
| $-4 \cdot -4$: | $-8$ |

Therefore,

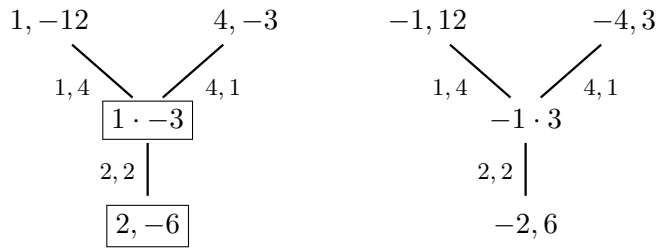
$$x^2 + 10x + 16 = (x + 2)(x + 8)$$

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

**Solution.**

$$\underline{\mathbf{3}}$$
$$1 \cdot -3$$
$$-1 \cdot 3$$

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




Therefore,

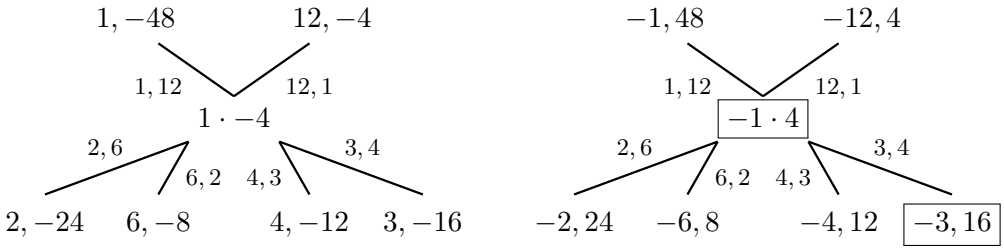
$$4x^2 - 4x - 3 = (2x - 3)(2x + 1)$$

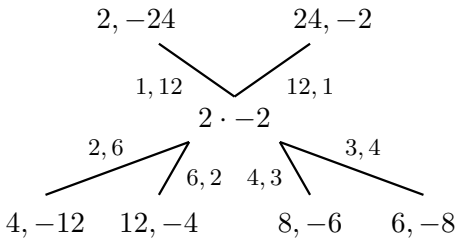
**Problem 10.** (10pt) Factor $12x^2 + 13x - 4$. Show all your work.

**Solution.**

$$\underline{\mathbf{4}}$$
$$1 \cdot -4$$
$$-1 \cdot 4$$
$$2 \cdot -2$$

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




Therefore,

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