

HW 5 - 1 Answers. Join my G.Classrm: [uj27d9](#)

1. $3(x^2 - 2)(x + 7)$

2. $(5y + 7)(2x + 3)$

3. $(x + 9)(x^2 - 2)$

4. $(4x - 1)(x + 7)$

5. $-9(2x + 3)$

6. $(3x + 4)(2x - 3)$

7. $(4x + 1)(2x - 3)$

8. $(x - 5)(x + 1)(x - 2)^2$

9. $(5 - x)(25 + 5x + x^2)$

10. $(2y^2 - 3)(4y^4 + 6y^2 + 9)$

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Factor each of the following:

1. $3x^3 + 21x^2 - 6x - 42$

$$\begin{aligned}
 &= 3x^2(x+7) - 6(x+7) \\
 &= (3x^2 - 6)(x+7) \\
 &= 3(x^2 - 2)(x+7)
 \end{aligned}$$

2. $10xy + 14x + 15y + 21$

$$\begin{aligned}
 &= 2x(5y+7) + 3(5y+7) \\
 &= (5y+7)(2x+3)
 \end{aligned}$$

3. $x^3 + 9x^2 - 2x - 18$

$$\begin{aligned}
 &= x^2(x+9) - 2(x+9) \\
 &= (x+9)(x^2 - 2)
 \end{aligned}$$

4. $(4x - 1)(3x + 2) - (4x - 1)(2x - 5)$

$$\begin{aligned}
 &= (4x-1)(3x+2 - (2x-5)) \\
 &= (4x-1)(3x+2-2x+5) \\
 &= (4x-1)(x+7)
 \end{aligned}$$

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$$\begin{aligned}
 5. \quad & (2x+3)(x-4) - (2x+3)(x+5) \\
 & = (2x+3)(x-4-(x+5)) \\
 & = (2x+3)(x-4-x-5) \\
 & = -9(2x+3)
 \end{aligned}$$

$$\begin{aligned}
 7. \quad & 8x^2 - 10x - 3 \quad \begin{array}{l} p: -24 \\ s: -10 \\ -12, 2 \end{array} \\
 & = 8x^2 - 12x + 2x - 3 \\
 & = 4x(2x-3) + 1(2x-3) \\
 & = (2x-3)(4x+1)
 \end{aligned}$$

$$\begin{aligned}
 6. \quad & 6x^2 - x - 12 \quad \begin{array}{l} p: -72 \\ s: -1 \\ -9, 8 \end{array} \\
 & = 6x^2 - 9x + 8x - 12 \\
 & = 3x(2x-3) + 4(2x-3) \\
 & = (2x-3)(3x+4)
 \end{aligned}$$

$$\begin{aligned}
 8. \quad & (x^2 - 4x)^2 - (x^2 - 4x) - 20 \\
 & \text{Let } u = x^2 - 4x \\
 & u^2 - u - 20 \\
 & = (u-5)(u+4) \\
 & = (x^2 - 4x - 5)(x^2 - 4x + 4) \\
 & = (x-5)(x+1)(x-2)(x-2) \\
 & = (x-5)(x+1)(x-2)^2
 \end{aligned}$$

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$$\begin{aligned}
 9. \quad & 125 - x^3 \\
 & a = 5 \\
 & b = x \\
 & (5-x)(25+5x+x^2)
 \end{aligned}$$

$$\begin{aligned}
 10. \quad & 8y^6 - 27 \quad a = \sqrt[3]{8y^6} \\
 & a = 2y^2 \\
 & b = 3 \\
 & (2y^2-3)(4y^2+6y+9)
 \end{aligned}$$

$$\begin{aligned}
 \sqrt[3]{8} &= 2 \quad \text{b/c } 2 \cdot 2 \cdot 2 = 8 \\
 \sqrt[3]{y^6} &= y^2 \quad \text{b/c } \underbrace{y^2 \cdot y^2 \cdot y^2}_{y^6} = y^6
 \end{aligned}$$

$$(2y^2-3)((2y^2)^2 + 6y^2 + 9)$$

$$(2y^2-3)(4y^4 + 6y^2 + 9)$$

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Let's do the last problem from Day 1:

Given 1 is a zero of the function $f(x) = x^4 - 4x^3 + 2x^2 + 4x - 3$,

find the remaining zeros. $f(x) = 0$

$$\begin{aligned} x^2 - 2x + 1 &= 0 \\ (x-1)(x-1) &= 0 \end{aligned}$$

$$x-1=0$$

$$x=1$$

$$x-1 \overline{) x^2 + 2x + 1}$$

$$x^2(x-1) \rightarrow -(x^4 - x^3)$$

$$\begin{array}{r} x-1 \overline{) x^4 - 4x^3 + 2x^2 + 4x - 3} \\ \underline{-(x^4 - x^3)} \\ -3x^3 \end{array}$$

$$x^3 - 3x^2 - x + 3 = 0$$

$$(x-3)(x^2-1) = 0$$

$$\begin{array}{l|l} x=3 & x^2=1 \\ \hline & x=\pm 1 \end{array}$$

$$\{3, 1, -1, 1\}$$

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Factor each of the following completely.

Hint: you may need to use substitution to make the question look more familiar.

Finish for HW any problems you did not complete in class.

1. $(x^2 + 3x)^2 - 2(x^2 + 3x) - 8$

Let $u = (x^2 + 3x)$

$$u^2 - 2u - 8$$

$$(u-4)(u+2)$$

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

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

2. $(x^2 - x)^2 - 8(x^2 - x) + 12$

Let $u = (x^2 - x)$

$$u^2 - 8u + 12$$

$$(u-6)(u-2)$$

$$(x^2 - x - 6)(x^2 - x - 2)$$

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

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$$\begin{aligned}
 3. \quad & \underbrace{x^4 - 3x^2 - 10}_{(x^2-5)(x^2+2)} + \underbrace{4x^3 + 8x}_{4x(x^2+2)} \\
 & (x^2-5)(x^2+2) + 4x(x^2+2) \\
 & (x^2+2)(x^2+4x-5) \\
 & = (x^2+2)(x+5)(x-1)
 \end{aligned}$$

$$\begin{aligned}
 4. \quad & \underbrace{x^4 - 7x^2 - 18}_{(x^2-9)(x^2+2)} + \underbrace{x^3 - 9x}_{x(x^2-9)} \\
 & (x^2-9)(x^2+2) + x(x^2-9) \\
 & = (x^2-9)(x^2+x+2) \\
 & = (x+3)(x-3)(x^2+x+2)
 \end{aligned}$$

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$$\begin{aligned}
 5. \quad & x^4 + 2x^3 - 8x - 16 \\
 & = x^3(x+2) - 8(x+2) \\
 & = (x+2)(x^3-8) \\
 & = (x+2)(x-2)(x^2+2x+4)
 \end{aligned}$$

Aside:

$$\begin{aligned}
 x^3 - 8 &= (x-2)(x^2+2x+4) \\
 a &= x \\
 b &= 2
 \end{aligned}$$

$$\begin{aligned}
 6. \quad & x^6 + 2x^4 - 16x^2 - 32 \\
 & = x^4(x^2+2) - 16(x^2+2) \\
 & = (x^2+2)(x^4-16) \\
 & = (x^2+2)(x^2+4)(x^2-4) \\
 & = (x^2+2)(x^2+4)(x+2)(x-2)
 \end{aligned}$$

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7. Let x and y be integers such that $x^3 - y^3 = 48$. If $x - y = 3$ and $3xy = 18$, what is $x^2 + y^2$?

$$\begin{aligned} a &= x \\ b &= y \end{aligned}$$

$$x^3 - y^3 = 48$$

$$xy = 6$$

$$(x-y)(x^2+xy+y^2) = 48$$

$$\downarrow$$

$$\frac{3(x^2+6+y^2)}{3} = \frac{48}{3}$$

$$x^2+6+y^2 = 16$$

$$x^2+y^2 = 10$$

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8. If $(2x^2 + bx - 10)(x + 5) = 2x^3 + 17x^2 + 25x - 50$ is true for all values of x , what is b ?

$$x(2x^2 + bx - 10) + 5(2x^2 + bx - 10) = 2x^3 + 17x^2 + 25x - 50$$

$$\begin{array}{r} 2x^3 + bx^2 - 10x + 10x^2 + 5bx - 50 = 2x^3 + 17x^2 + 25x - 50 \\ -2x^3 \qquad \qquad \qquad +50 - 2x^3 \qquad \qquad \qquad +50 \end{array}$$

$$\begin{array}{r} bx^2 + 10x^2 - 10x + 5bx = 17x^2 + 25x \\ -10x^2 + 10x \qquad \qquad -10x^2 + 10x \end{array}$$

$$bx^2 + 5bx = 7x^2 + 35x$$

$$\begin{array}{l} bx^2 = 7x^2 \\ b = 7 \end{array} \qquad \begin{array}{l} 5bx = 35x \\ b = 7 \end{array}$$

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9. If $(2x + 3)(4x^2 - 5x + 6) = ax^3 + bx^2 + cx + d$, what is the value of $2b + c$?

$$2x(4x^2 - 5x + 6) + 3(4x^2 - 5x + 6)$$

$$8x^3 - 10x^2 + 12x + 12x^2 - 15x + 18$$

$$8x^3 + 2x^2 - 3x + 18$$

$$a = 8$$

$$c = -3$$

$$b = 2$$

$$d = 18$$

$$2b + c = 2(2) + (-3) \\ = 1$$

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10. From Alg2CC Regents January 2017

Algebraically determine the values of h and k to correctly complete the identity stated below:

$$2x^3 - 10x^2 + 11x - 7 = (x - 4)(2x^2 + hx + 3) + k$$

$$2x^3 - 10x^2 + 11x - 7 = x(2x^2 + hx + 3) - 4(2x^2 + hx + 3) + k$$

$$2x^3 - 10x^2 + 11x - 7 = 2x^3 + hx^2 + 3x - 8x^2 - 4hx - 12 + k$$

$$-2x^3$$

$$-2x^3$$

$$-10x^2 + 11x - 7 = \underbrace{hx^2 - 8x^2}_{-2x^2} + \underbrace{-4hx + 3x}_{-2x} + \underbrace{-12 + k}_{-7}$$

$$-10x^2 = hx^2 - 8x^2$$

$$11x = -4hx + 3x$$

$$-7 = -12 + k$$

$$-2x^2 = hx^2$$

$$8x = -4hx$$

$$5 = k$$

$$-2 = h$$

$$-2 = h$$

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11. Similar question

Algebraically determine the values of h and k to correctly complete the identity stated below:

$$3x^3 - 2x^2 - 13x + 8 = (x - 2)(3x^2 + hx - 5) + k$$

$$3x^3 - 2x^2 - 13x + 8 = x(3x^2 + hx - 5) - 2(3x^2 + hx - 5) + k$$

$$\underline{3x^3 - 2x^2 - 13x + 8} = \underline{3x^3 + hx^2 - 5x} - \underline{6x^2 - 2hx + 10} + \underline{k}$$

$$-2x^2 = +hx^2 - 6x^2 \quad -13x = -5x - 2hx \quad 8 = 10 + k$$

$$4x^2 = hx^2 \quad -8x = -2hx \quad -2 = k$$

$$4 = h \quad 4 = h$$

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