

MAT 1420

Writing Project #0, Spring 2024

Steve Mills

1. Simplify $5 - 2(3x - 5) + 7(2 - 3x)$

There is at least one error in these solutions.

$$5 - 2(3x - 5) + 7(2 - 3x)$$

$$= 5 - 6x + 10 + 14 - 21x$$

$$= \boxed{-27x + 29}$$

2. Multiply

a. $3(2x^2)(2x + 3)(6x - 2)$

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

$$= (6x^2)(12x^2 - 4x + 18x - 6)$$

$$= 6x^2(12x^2 + 14x - 6)$$

$$= \boxed{72x^4 + 84x^3 - 36x^2}$$

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

$$= 6x^3 - 9x^2 + 21x - 4x^2 + 6x - 14$$

$$= \boxed{6x^3 - 13x^2 + 27x - 14}$$

$$\begin{array}{r} 12 \\ -11 \\ \hline 1 \\ -12 \\ \hline -11 \\ 2 \\ \hline -9 \end{array}$$

$$\begin{array}{r} -132 \\ + 49 \\ \hline -83 \end{array}$$

3. Evaluate $b^2 - 4ac$ if $a = 3, b = -7$, and $c = 11$

$$b^2 - 4ac = 7^2 - 4(3)(11) = 49 - 132 = \boxed{-83}$$

I'll ding you for

$$-7^2 - 4(3)(11)$$

This is fine!

$$(-7)^2 - 4(3)(11)$$

MAT 1420

4. Write $\frac{2310}{660}$ in lowest terms.

$$\frac{2310}{660} = \frac{2^2 \cdot 5^2 \cdot 23}{2^2 \cdot 3 \cdot 5 \cdot 11} = 2^{2-2} \cdot 3^{-1} \cdot 5^{2-1} \cdot 23 \cdot 11^{-1}$$

$$= \frac{2^0 \cdot 5^1 \cdot 23}{3 \cdot 11} = \frac{115}{33}$$

$$= \frac{5^1 \cdot 23}{3 \cdot 11} = \frac{5 \cdot 23}{33} = \frac{115}{33}$$

2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31

$$\begin{array}{r} 2 \overline{) 2310} \\ \underline{2} \\ 1150 \\ \underline{2} \\ 575 \\ \underline{5} \\ 115 \\ \underline{5} \\ 23 \end{array}$$

$$\begin{array}{r} 2 \overline{) 660} \\ \underline{2} \\ 330 \\ \underline{2} \\ 165 \\ \underline{3} \\ 55 \\ \underline{5} \\ 11 \end{array}$$

$$\frac{230}{2} = 115$$

5. Simplify $\sqrt{37800}$ without using a calculator.

$$= \sqrt{2^3 \cdot 3^3 \cdot 5^2 \cdot 7}$$

$$= \sqrt{2^2 \cdot 2 \cdot 3^2 \cdot 3 \cdot 5^2 \cdot 7}$$

$$= 2 \cdot 3 \cdot 5 \sqrt{2 \cdot 7}$$

$$= 30\sqrt{14}$$

$$\begin{array}{r} 2 \overline{) 37800} \\ \underline{2} \\ 18900 \\ \underline{2} \\ 9450 \\ \underline{3} \\ 4925 \\ \underline{3} \\ 1575 \\ \underline{3} \\ 525 \\ \underline{5} \\ 175 \\ \underline{5} \\ 35 \\ \underline{7} \\ 0 \end{array}$$

| | |
|-------|-------|
| | 37800 |
| Ans/2 | 18900 |
| Ans/2 | 9450 |
| Ans/2 | 4725 |
| Ans/3 | 1575 |
| Ans/3 | 525 |
| Ans/3 | 175 |

6. Factor, if possible:

a. $x^2 - 3x - 10$

$-10 = (-5)(2)$ and $-5+2 = -3$ ✓

$$= x^2 - 5x + 2x - 10$$

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

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

6. Factor, if possible:

b. $9x^2 - 16 = 3^2x^2 - 4^2 = (3x)^2 - 4^2$

$$= (3x-4)(3x+4)$$

$$a^2 - b^2 = (a-b)(a+b)$$

MAT 1420

7. Simplify. Assume all variables represent nonzero real numbers. Your final answer should contain only positive exponents.

a. $(a^2b^{-3})(a^{-5}b^2) = 2^{-5} b^{-3+2} = 2^{-3}b^{-1} = \boxed{\frac{1}{2^3b}}$

b. $(a^2b^{-3})^{-2}(a^{-5}b^2)^4$
 $= (a^{\overbrace{2}^{-2}}b^{-3})^{-2}(a^{-5}b^2)^4$
 $= (a^{2(-2)}b^{3(-2)})(a^{-5(4)}b^{2(4)})$
 $= (a^{-4}b^6)(a^{-20}b^8) = 2^{-4-20} b^{6+8} = \boxed{\frac{b^{14}}{2^{24}}}$

c. $\frac{3^4 x^5 y^{-2}}{9x^{-3}y^{-7}} = \frac{3^4 x^5 (-3) y^{-2-(-7)}}{3^2} = 3^{4-2} x^8 y^{-2+7} = \boxed{3^2 x^8 y^5}$
 $= 9x^8 y^5$ either one.

d. $\frac{(6x^2y^3)^{-2}}{(15x^{-2}y^{-5})^4} = \frac{6^{-2} x^{-4} y^{-6}}{15^4 x^{-8} y^{-20}} = \frac{3^{-2} \cdot 2^{-2} x^{-4+8} y^{-6+20}}{3^4 \cdot 5^4}$
 $= \frac{x^4 y^{14}}{3^2 \cdot 5^4 \cdot 2^2} = \boxed{\frac{x^4 y^{14}}{22500}}$
 $15^4 = ((3)(5))^4 = 3^4 5^4$

MAT 1420

8. Consider the equation $ax^2 + bx + c = 0$. Write the discriminant.

Discriminant is $b^2 - 4ac$ = what goes under the radical in the quadratic formula.