ASSIGNMENT 7

DYLAN ZWICK'S MATH

Section 5.1

In Exercises 1-20, use the rules of exponents to simplify the expression.

5.1.1: (a) $-3x^3 \cdot x^5 = -3x^8$ (b) $(-3x)^2 \cdot x^5 = 9x^7$

5.1.2: (a) $5^2y^4 \cdot y^2 = 25y^6$ (b) $(5y)^2 \cdot y^4 = 25y^6$

5.1.5: (a) $(u^3v)(2v^2) = 2u^3v^3$ (b) $(-4u^4)(u^5v) = -4u^9v$

5.1.8: (a) $(3y)^3(2y^2) = 54y^5$ (b) $3y^3 \cdot 2y^2 = 6y^5$

5.1.11: (a)$\frac{27m^5n^6}{9mn^3} = 3m^4n^3$ (b)$\frac{-18m^3n^6}{-6mn^3} = 3m^2n^3$

5.1.13: (a) $(\frac{3x}{4y})^2 = \frac{9x^2}{16y^2}$ (b) $(\frac{5u}{3v})^3 = \frac{125u^3}{27v^3}$

5.1.15: (a)$-\frac{(-2x^2y)^3}{9x^2y^2} = \frac{8x^4y}{9}$ (b) $-\frac{(-2xy^3)^2}{6y^2} = -\frac{2x^2y^4}{3}$

5.1.17: (a) $[\frac{(-5u^3v)^2}{10u^2v}]^2 = \frac{25u^8v^2}{4}$ (b) $[\frac{-5(u^3v)^2}{10u^2v}]^2 = \frac{u^8v^2}{4}$

5.1.19: (a) $\frac{x^{2n+4}y^{4n}}{x^5y^{2n+1}} = x^{2n-1}y^{2n-1}$ (b) $\frac{x^{6n}y^{n-7}}{x^{4n+2}y^5} = x^{2n-2}y^{n-12}$

In Exercises 21-50, evaluate the expression.

5.1.21: $5^{-2} = \frac{1}{25}$
5.1.27: $\frac{1}{4^{-3}} = 64$
5.1.30: $-\frac{1}{6^{-2}} = -36$
5.1.38: $\frac{5^{-1}}{5^2} = \frac{1}{125}$
5.1.39: $\frac{10^3}{10^{-2}} = 100,000$
5.1.44: $\frac{10^{-5}}{10^{-6}} = 16$
5.1.50: $(32 + 4^{-3})^0 = 1$

In Exercises 51-90, rewrite the expression using only positive exponents, and simplify.

5.1.51: $y^4 \cdot y^{-2} = y^2$

5.1.55: $7x^{-4} = \frac{7}{x^4}$

5.1.63: $\frac{(4t)^0}{t^{-2}} = t^2$

5.1.67: $(-3x^{-3}y^2)(4x^2y^{-5}) = -\frac{12}{xy^3}$

5.1.69: $(3x^2y^{-2})^{-2} = \frac{y^4}{9x^4}$

5.1.73: $\frac{6x^3y^{-3}}{12x^{-2}y} = \frac{x^5}{2y^4}$

5.1.75: $(\frac{3u^2v^{-1}}{3^3u^{-1}v^3})^{-2} = \frac{81v^8}{u^6}$

5.1.78: $(\frac{a^{-3}}{b^{-3}})(\frac{a}{b})^3 = \frac{b^6}{a^6}$

5.1.80: $(ab)^{-2}(a^2b^2)^{-1} = \frac{1}{a^4b^4}$

5.1.87: $(u + v^{-2})^{-1} = \frac{v^2}{uv^2+1}$

5.1.90: $\frac{u^{-1}-v^{-1}}{u^{-1}+v^{-1}} = \frac{v-u}{v+u}$

In Excercise 91, evaluate the expression when $x = -3, y = -4$

5.1.91: $x^2 \cdot x^{-3} \cdot x \cdot y$
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In Exercises 101-114, write the number in scientific notation.

5.1.101: $3,600,000 = 3.6 \times 10^6$
5.1.105: $0.00031 = 3.1 \times 10^{-4}$
5.1.108: $0.0000000000692 = 6.92 \times 10^{-11}$

In Exercise 115, write the number in decimal notation.

5.1.115: $7.2 \times 10^8 = 720,000,000$

In Exercise 133, evaluate the expression

5.1.133: $\frac{64{,}000{,}000}{0.00004} = 1.6 \times 10^{12}$

5.1.144: A studey by Australian astronomers estimated the number of stars within range of modern telescopes to be $70,000,000,000,000,000,000,000$. Write this number in scientific notation.
$7 \times 10^2 2$

5.1.145: A cube of copper with an edge of 1 centimeter has approximately 8.483×10^{22} free electrons. Write this real number in decimal notation.
$84,830,000,000,000,000,000,000$

5.1.151: In 2005, the redident population of the United States was about 296 million people, and it would have cost each resident about $26,600 to pay off the federal debt. Use these two numbers to approximate the federal debt in 2005.
$7,870,000,000,000$

Section 5.2

In Exercises 1-12, write the plynomial in standard form, and find its degree and leading coefiiicient.

5.2.1: $4y + 16 \rightarrow 4y + 16; 1; 4$

5.2.3: $2x + x^2 - 6 \rightarrow x^2 + 2x - 6; 2; 1$

5.2.7: $4 - 14t^4 + t^5 - 20t \rightarrow t^5 - 14t^4 - 20t + 4; 5; 1$

5.2.11: $v_0t - 16t^2$(v_0 is constant.)$\rightarrow -16t^2 + v_0t; 2; -16$

In Exercises 13-18, determine whether the polynomial is a monomial , a binomial , or a trinomial.

5.2.13: $12 - 5y^2$ Binomial

5.2.15: $x^3 + 2x^2 - 4$ Trinomial

5.2.16: t^3 Monomial

In Exercises 19-22, give an example of a polynomial in x that satisfies the conditions.

5.2.19: A monomial of degree 2 x^2

5.2.22: A monomial of degree 0 1

In Ecercises 23-26, state why the expression is not a polynomial.

5.2.23: $y^{-3} - 2$ because -3 is negative

5.2.1: $6 - \sqrt{n}$ because $\frac{1}{2}$ is not an integer

In Exercises 27-42, use a horizontal format to find the sum.

5.2.29: $(2x^2 - 3) + (5x^2 + 6) = 7x^2 + 3$

5.2.31: $(5y + 6) + (4y^2 - 6y - 3) = 4y^2 - y + 3$

5.2.34: $(z^3 + 6z - 2) + (3z^2 - 6z) = z^3 + 3z^2 - 2$

5.2.40: $(2 - \frac{1}{4}y^2 + y^4) + (\frac{1}{3}y^4 + 7x - \frac{1}{2}x^3) = \frac{4}{3}y^4 - \frac{7}{4}y^2 - 1$

In Exercises 43-50, use a vertical format to find the sum.

5.2.43:

$$\begin{array}{lr} 5x^2 - 3x+ & 4 \\ -3x^2 & 4 \\ \hline \end{array}$$

$2x^2 - 3x$

5.2.47: $(5p^2 - 4p + 2) + (-3p^2 + 2p - 7) = 2p^2 - 2p - 5$

5.2.53: $(3x^2 - 2x + 1) - (2x^2 + x - 1) = x^2 - 3x - 2$

5.2.61: Substract $3x^3 - (x^2 + 5x)$ from $x^3 - 3x = -2x^3 + x^2 + 2x$

5.2.63:

$$\begin{array}{rr} x^2- & x+3 \\ -(& x-2) \\ \hline \end{array}$$

$x^2 - 2x + 5$

5.2.69: $-(2x^3 - 3) + (4x^3 - 2x) = 2x^3 - 2x + 3$

5.2.71: $(4x^5 - 10x^3 + 6x) - (8x^5 - 3x^3 + 11) + (4x^5 + 5x^3 - x^2) = -2x^3 - x^2 + 6x - 11$

5.2.75: $(8x^3 - 4x^2 + 3x) - [(x^3 - 4x + 5) + (x - 5)] = 7x^3 + 2x$

5.2.86: $(6x^{2r} - 5x^r + 4) + (2x^{2r} + 2x^r + 3) = 5x^{2r} - 8x^r + 3-$

5.2.97: Find the height in feet of a free-falling object at the specified times using the position function $h(t) = -16t^2 + 64$. Then describe the vertical path of the object.
(a) $t = 0$ 64 feet (b) $t = \frac{1}{2}$ 60 feet
(c) $t = 1$ 48 feet (d) $t = 2$ 0 feet

5.2.97: An object is dropped from a hot-air balloon that is 200 feet above the ground. Use the position fuction $h(t) = -16t^2 + 200$ to find the heights of the object when $t = 1, 2, 3$ 184 feet, 136 feet, 56 feet

Section 5.3

In Exercises 1-14, perform the indicated multiplications.

5.3.1: $(-2a^2)(-8a) = 16a^3$

5.3.3: $2y(5 - y) = -2y^2 + 10y$

5.3.5: $4x(2x^2 - 3x + 5) = 8x^3 - 12x^2 + 20x$

5.3.7: $-2m^2(7 - 4m + 2m^2) = -4m^4 + 8m^3 - 14m^2$

5.3.10: $-y^4(7y^3 - 4y^2 + y - 4) = -7y^7 + 4y^6 - y^5 + 4y^4$

5.3.12: $-7t(2t)(6 - 3t) = 42t^3 - 84t^2$

In Exercises 15-32, multiply using the FOIL Method.

5.3.15: $(x + 2)(x + 4) = x^2 + 6x + 8$

5.3.17: $(x - 4)(x + 4) = x^2 - 16$

5.3.20: $(x - 6)(x + 6) = x^2 - 36$

5.3.23: $(5x - 2)(2x - 6) = 10x^2 - 34x + 12$

5.3.24: $(4x + 7)(3x + 7) = 12x^2 + 49x + 49$

5.3.28: $(3z - \frac{3}{4})(4z - 8) = 12z^2 - 27z + 6$

5.3.30: $(2x - y)(3x - 2y) = 6x^2 - 7xy + 2y^2$

In Exercises 33, 41, use a horizontal format to find the product.

5.3.33: $(x-1)(x^2-4x+6)=x^3-5x^2+10x-6$

5.3.41: $(5x^2+2)(x^2+4x-1)=5x^4+20x^3-3x^3+8x-2$

In Exercises 45, 50 , use a vertical format to find the product.

5.3.45:

$$\begin{array}{lr} 7x^2- & 14x+9 \\ \times & 2x+1) \\ \hline \end{array}$$

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

5.3.50: $(2s^2-5s+6)(3s-4)=6s^3-23s^2+38s-24$

In Exercises 53-82, use a special product formula to find the product.

5.3.53: $(x+2)(x-2)=x^2-4$

5.3.61: $(2a+5b)(2a-5b)=4a^2-25b^2$

5.3.69: $(x+5)^2=x^2+10x+25$

5.3.100: A closed rectangular box has sides of lengths $2n-2, 2n+2, 2n$ inches.
(a) Write a polynomial function $V(n)$ that represents the volume of the box.
$V(n)=8n^3-8n$
(b)What is the volume if the length of the sortest side is 4

inches? 192 cubic inches

(c)Write a polynomial function $A(n)$ taht represents the area of the base of the box.
$A(n) = 4n^2 - 4$ (d)Write a polynomial function $A_1(n)$for the area of the base if the length and width increase by 3. Show that the area of the base is not $A(n+4)$.
$A(n+4) = 4n^2 + 32n + 60 \neq 4n^2 + 12n + 5 = A_1(n)$