MATH 5071 - Problem Set 1

Dr. Rachael M. Kratzer, rmk24@psu.edu

Due Date: 2014 July 01

What is a Variable?

1) The cost of 6 computers and 2 printers is \$6,400. Write a variable expression that relates the price of a computer and the price of a printer to the total cost. Be sure to *clearly* define each of your variables.

2) The radius of the Earth is equal to three times its volume divided by its surface area. Write a variable expression that relates the radius of the Earth to the volume and surface area of the Earth. Be sure to *clearly* define each of your variables.

3) When 6 is added to four times a number, the result is 50. *Clearly* define your variable and solve.

4) Given that $a = 3$, $b = 5$, and $c = -2$, evaluate $(2b + 4c)^a$.

5) Rewrite the following variable expression using an alternative notation: $a \cdot b \div c \cdot d$

Addition/Subtraction of Polynomials

6) Simplify: $(2x - 7y) + (-4x - 2y)$

7) Simplify: $4x^2 + (x + x^2) - 2 - 3x - 5x^2 - 8x^2 - 13x - 21 + 34x$

8) Simplify: $2(3p + 4q - 2r) + 3(-3p - 2q + r)$

9) Simplify: $5xy - 6x + 3y$

10) Simplify: $a(-4b + 2c) - 3ac + 10(ab + ac)$

Properties of Exponents

11) Rewrite as a product: $(2y - x)^4$

12) Rewrite as an exponential: $2x \cdot 2x \cdot 2x \cdot 2x \cdot 2x \cdot 2x$

13) Simplify: $-5rs^{-8} \cdot -8r^{-2}s^2 \cdot -4r^5s^{15}$

14) Simplify. **Do not** report your answer as a fraction (use negative exponents): $\frac{5fg^{52}}{f^{-5}g^{32}}$

15) Simplify. Report your final answer **without** negative exponents: $\frac{m^6(n^{-40})^3}{(n^2)^{-39}m^{-2}}$

Multiplying Polynomials

16) Multiply and simplify: $-x^2(x^2 - 6x + 5)$

17) Multiply and simplify: $mn^2(2m^2 - mn - n^2)$

18) Multiply and simplify: $(2x + 9)(5x + 1)$

19) Multiply and simplify: $(a - b)^2$

20) Multiply and simplify: $(a^2 - ab + b^2)(a + b)$

Dividing Polynomials

21) Divide: $(2x^4 + 5x^2 + 6x - 1) \div (x + 1)$

22 Divide: $12x^3 - 13x^2 - 23x + 24) \div (4x - 4)$

23) Divide: $\frac{-x^4+7x^3+4x^2-6x-8}{x-1}$

24) Divide: $(x^6 - 1) \div (x^2 - 1)$