Fourth Set of Homework for Math 05

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Please note: You should fully justify your answers.

Evaluation of algebraic expressions

1. Evaluate each of the following expressions

   A. $(a+b)^2$ B. a^2+b^2 C. $a^2+2ab+b^2$

   for the following values of the variables:

   (a) $a=1$, $b=4$

   (b) $a=0$, $b=-2$

   (c) $a=5$, $b=-3$

   (d) $a=2$, $b=-2$

   (e) $a=-3$, $b=-2$

   (f) $a=\dfrac{1}{2}$, $b=-2$

   (g) $a=-\dfrac{1}{3}$, $b=-\dfrac{1}{2}$

2. Evaluate each of the following expressions for $a=2$, $b=-4$, $c=3$, and $d=-5$:

   (a) $2a-3b-c+10d$

   (b) a^2+b^2

   (c) $-a^2+3b$

   (d) $2b(a^2-2d)$

   (e) a^2-b^2

   (f) a^3+b^3

   (g) $4-3c+2c^2$

   (h) $-2a^2+6a-4$

   (i) dc^2-4ab

   (j) $\dfrac{2a-b}{-d+c}$

   (k) $\dfrac{a^2-3b}{-d^2+3c}$

   (l) $(a+b)(a-b)$

   (m) $(c+d)(c^2-cd+d^2)$

3. Do the given values of the variables make the following statements **true** or **false**?

   (a) $2x+3y=-2$; $\quad x=5, y=-4$

   (b) $-y^2+y=-2y$; $\quad y=3$

   (c) $|2x-y|=-2$; $\quad x=-3, y=-4$

   (d) $x^2+y^2<16$; $\quad x=3, y=-3$

   (e) $\dfrac{2x}{y^2}=-3xy$; $\quad x=0, y=4$

4. In the formula

$$P = \frac{I}{rt}$$

P stands for the principal, I for the total interest earned, r for the rate of interest, and t for the time, in years, that the money was invested. Find the principal if the total interest earned in 3 years at a rate of 4% is \$720.

5. The area A of a triangle with base b and height h is given by the formula

$$A = \frac{1}{2}bh$$

Find the area of a triangle with base 5 in and height 4 in.

6. The volume of a sphere of radius r is given by the formula

$$V = \frac{4}{3}\pi r^3$$

where π is the area of a circle of radius 1 (this is a number *approximately* equal to 3.14159265358979). Find the volume of a sphere of radius 3 cm.

Translating to algebra

1. Write an algebraic expression for each of the following English phrases. If you introduce variables, state clearly what the stand for.
   (a) The product of negative eight and an unknown number.
   (b) The quotient of x and 3.
   (c) Three fifths of an unknown number.
   (d) The difference of negative nine and the product of -4 and a.
   (e) The sum of a number and its square.
   (f) Three times a number is subtracted from five.
   (g) Seven less than twice the sum of an unknown number and six.
   (h) The third power of a number is subtracted from the product of eight and the number.
   (i) Eleven more than the square of the sum of twice a number and three.
   (j) The difference of the quotient of the sum of twice a number and three and seven and seven times the sum of the number and six.
2. Translate the following sentences into Mathematics. If you introduce variables, state clearly what the stand for.
   (a) The sum of two consecutive integers is nine.
   (b) The product of two consecutive integers is equal to twenty two more than ten times the smaller of the two numbers.
   (c) The width of a rectangle is three more than twice its length.
   (d) Three times the sum of a number and six equals the difference of the number and eight.
   (e) The sum of twice a number and twenty is smaller than three times the number plus seven.
   (f) The difference of two thirds of an unknown number and eleven is greater than the sum of five halves of the number and nine.
   (g) The absolute value of five less than six times a number is equal to twenty three.