

**MATH 7: HANDOUT 4**  
**ALGEBRAIC EXPRESSIONS AND IDENTITIES**

MAIN ALGEBRAIC IDENTITIES

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

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

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

HOMEWORK

1. Simplify:

(a)  $\sqrt{\frac{56}{13}} \cdot \sqrt{\frac{26}{7}} =$

(c)  $\frac{\sqrt{48}}{\sqrt{15}} =$

(b)  $\sqrt{48} =$

2. Express the following expressions in the form  $2^r 3^s a^m b^n$ :

(a)  $8a^3 b^2 (27a^3)(2^5 ab) =$

(c)  $16a^2 b^3 (6ab^4)(ab^2)^3 =$

(b)  $3^2 (2ab)^3 (16a^2 b^5)(24b^2 a) =$

3. Expand as sums of powers of  $x$ :

(a)  $(2x + 5)^2 =$

(d)  $(1 - x)^2(2 - x) =$

(b)  $(2 - 4x)^2 =$

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

(c)  $(1 - 2x)^2 =$

4. Factor (i.e., write as a product) the following expressions:

(a)  $a^2 - 2a + 1$

(h)  $256 - a^8 b^8$

(b)  $a^2 + 4ab + 4b^2$

(i)  $3x^3 - x^2 y + 6x^2 y - 2xy^2 + 3xy^2 - y^3$

(c)  $4x^2 + 8xy + 4y^2$

(j)  $a^2 - b^2 - 10b - 25$

(d)  $9x^2 - 25$

(k)  $x^4 + 4$

(e)  $(x - 2)^2 - (y + 3)^2$

[Hint: add and then subtract  $4x^2$ .]

(f)  $(x - 2)^2 - 10(x - 2) + 25$

(g)  $a^4 - b^4$  [Hint:  $a^4 = (a^2)^2$ .]

5. Solve the following equations.

(a)  $5(x + 1) = 3x + 2$

(d)  $(x - 3)(x + 4) = 0$

(b)  $(x^2 - 1)(x + 2) = 0$

(e)  $x^2 + 4x = 0$

(c)  $\frac{x+2}{x+3} = 2$

(f)  $x^3 - 4x = 0$

6. A  $4 \times 4 \times 4$  cubical box has 64 small cubes inside. How many of these touch a side or the bottom of the box?

7. Amanda has an average of 92 on her seven tests. What should she get on her 8th test to have an average of 93?