Name: Solutions ________ / 20

No aids (calculator, notes, text, etc.) are permitted. Show all work for full credit and box your final answer.

1. [3 points] Complete the following **special binomials** formulas:

a. $A^2 - B^2 = (A-B)(A+B)$

b. $A^3 - B^3 = (A-B)(A^2+AB+B^2)$

c. $A^3 + B^3 = (A+B)(A^2-AB+B^2)$

2. [2 points] Complete the following **perfect square trinomials** formulas:

a. $(A+B)^2 = A^2+2AB+B^2$

b. $(A-B)^2 = A^2-2AB+B^2$

3. [2 points] Simplify the following rational expression, and indicate values of the variable that must be excluded:

$$\frac{18y^2-24y+8}{9y^2-4} = \frac{2(9y^2-12y+4)}{(3y)^2-2^2} = \frac{2(3y-2)^{\cancel{2}}}{(\cancel{3y-2})(3y+2)} = \frac{2(3y-2)}{3y+2}$$

$y \neq \frac{2}{3},\ y \neq -\frac{2}{3}$

4. [2 points] Add the following rational expressions:

$$\frac{x^2+2x-35}{x-5} + \frac{x-4}{x+3} = \frac{(x^2+2x-35)(x+3)+(x-4)(x-5)}{(x-5)(x+3)} = \frac{x^3+2x^2-35x+3x^2+6x-105+x^2-9x+20}{(x-5)(x+3)} = \frac{x^3+6x^2-38x-85}{(x-5)(x+3)}$$

5. [2 points] Simplify the complex rational expression:

$$\frac{1+xy}{x^{-2}-y^2} = \frac{1+xy}{\frac{1}{x^2}-y^2} = \frac{1+xy}{\frac{1-x^2y^2}{x^2}} = \frac{x^2\cancel{(1+xy)}}{(1-xy)\cancel{(1+xy)}} = \frac{x^2}{1-xy}$$

6. [3 points] Simplify the following complex expressions:

a. $\frac{2+3i}{-5+3i} = \frac{(2+3i)(-5-3i)}{(-5+3i)(-5-3i)} = \frac{-10+9-21i}{25+9} = \frac{-1-21i}{34}$

b. $-i^9\sqrt{-25} = -\underset{\underset{1}{\shortparallel}}{i^8} \cdot i\sqrt{-25} = -i \cdot i \cdot 5 = -i^2 \cdot 5 = 5$

7. [2 points] Solve the following linear equation

$$6(5w-5) = -31(3-w)$$

$$30w - 30 = -93 + 31w$$
$$w = -30 + 93$$
$$w = 63$$

8. [2 points] Solve the following absolute value equation

$$|4x+15| = 3$$

$4x+15 = 3$
$4x = -12$
$x = -3$

$4x+15 = -3$
$4x = -18$
$x = -\frac{18}{4} = -\frac{9}{2} = -4.5$

9. [2 points] Solve the following equation for the indicated variable:

Ideal Gas Law: $PV = nRT$, solve for T.

$$PV = nRT$$

$$\boxed{T = \frac{PV}{nR}}$$