Problem 1

Solve the equation: $8x - [5x - 4(x - 3)] = 37$

First, simplify the expression inside the brackets. Begin by distributing the -4 inside the parenthesis:

$$8x - [5x - 4x + 12] = 37$$

Next gather like terms:

$$8x - [x + 12] = 37$$

Remove the brackets by distributing the negative sign:

$$8x - x - 12 = 37$$

Combine like terms:

$$7x - 12 = 37$$

Isolate the variable term by adding 12 to both sides of the equation:

$$7x - 12 + 12 = 37 + 12$$

$$7x = 49$$

Solve for x by dividing both sides by 7:

$$x = \frac{49}{7}$$

$$x = 7$$

Thus, the solution to the equation $8x - [5x - 4(x - 3)] = 37$ is:

$$\boxed{x = 7}$$

Problem 2

Solve the equation: $10x^2 = 160$

We start with the given equation:

$$10x^2 = 160$$

To solve for x, first isolate x^2 by dividing both sides of the equation by 10:

$$x^2 = \frac{160}{10}$$

$$x^2 = 16$$

Next, solve for x by taking the square root of both sides. Remember to consider both the positive and negative square roots:

$$x = \pm\sqrt{16}$$

$$x = \pm 4$$

Thus, the solutions to the equation $10x^2 = 160$ are:

$$\boxed{x = 4 \text{ and } x = -4}$$

Problem 3

Solve the equation: $2x^2 + 3x - 20 = 0$

We start with the given quadratic equation:

$$2x^2 + 3x - 20 = 0$$

To solve for x, we use the quadratic formula, which is given by:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

For the equation $2x^2 + 3x - 20 = 0$, the coefficients are:

$$a = 2, \quad b = 3, \quad c = -20$$

Substitute these values into the quadratic formula:

$$x = \frac{-3 \pm \sqrt{3^2 - 4 \cdot 2 \cdot (-20)}}{2 \cdot 2}$$

$$x = \frac{-3 \pm \sqrt{9 + 160}}{4}$$

$$x = \frac{-3 \pm \sqrt{169}}{4}$$

$$x = \frac{-3 \pm 13}{4}$$

This gives us two solutions:

$$x = \frac{-3 + 13}{4} \quad \text{and} \quad x = \frac{-3 - 13}{4}$$

Simplify each solution:

$$x = \frac{10}{4} = \frac{5}{2} \quad \text{and} \quad x = \frac{-16}{4} = -4$$

Thus, the solutions to the equation $2x^2 + 3x - 20 = 0$ are:

$$\boxed{x = \frac{5}{2} \text{ and } x = -4}$$

Problem 4

Solve the equation: $3x^2 - 10x - 8 = 0$

We start with the given quadratic equation:

$$3x^2 - 10x - 8 = 0$$

To solve for x, we use the quadratic formula, which is given by:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

For the equation $3x^2 - 10x - 8 = 0$, the coefficients are:

$$a = 3, \quad b = -10, \quad c = -8$$

Substitute these values into the quadratic formula:

$$x = \frac{-(-10) \pm \sqrt{(-10)^2 - 4 \cdot 3 \cdot (-8)}}{2 \cdot 3}$$

$$x = \frac{10 \pm \sqrt{100 + 96}}{6}$$

$$x = \frac{10 \pm \sqrt{196}}{6}$$

$$x = \frac{10 \pm 14}{6}$$

This gives us two solutions:

$$x = \frac{10 + 14}{6} \quad \text{and} \quad x = \frac{10 - 14}{6}$$

Simplify each solution:

$$x = \frac{24}{6} = 4 \quad \text{and} \quad x = \frac{-4}{6} = -\frac{2}{3}$$

Thus, the solutions to the equation $3x^2 - 10x - 8 = 0$ are:

$$\boxed{x = 4 \text{ and } x = -\frac{2}{3}}$$

Problem 5

Solve the equation: $x^2 - 11x + 28 = 0$

We start with the given quadratic equation:

$$x^2 - 11x + 28 = 0$$

I can see this polynomial is factorable. Finding two numbers that multiply to 28 and add to -11 is -7 and -4, so:

$$(x - 7)(x - 4) = 0$$

Using the zero product rule,

$$x - 7 = 0 \quad \text{and} \quad x - 4 = 0$$

Thus, the solutions to the equation $x^2 - 11x + 28 = 0$ are:

$$\boxed{x = 7 \text{ and } x = 4}$$

Problem 6

Solve the equation: $4x^2 - 20x = -25$

We start with the given quadratic equation:

$$4x^2 - 20x = -25$$

To solve for x, we rearrange the equation into the general form $ax^2+bx+c = 0$:

$$4x^2 - 20x + 25 = 0$$

Now, we can use the quadratic formula, which is given by:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

For the equation $4x^2 - 20x + 25 = 0$, the coefficients are:

$$a = 4, \quad b = -20, \quad c = 25$$

Substitute these values into the quadratic formula:

$$x = \frac{-(-20) \pm \sqrt{(-20)^2 - 4 \cdot 4 \cdot 25}}{2 \cdot 4}$$

$$x = \frac{20 \pm \sqrt{400 - 400}}{8}$$

$$x = \frac{20 \pm \sqrt{0}}{8}$$

$$x = \frac{20}{8}$$

This gives us one solution:

$$x = \frac{20}{8} = \frac{5}{2}$$

Thus, there is only one solution to the equation $4x^2 - 20x = -25$ which is:

$$\boxed{x = \frac{5}{2}}$$

Problem 7

Solve the equation: $x^2 - 6x + 1 = 0$

For this problem, complete the square should be the quickest method to solve.

$$x^2 - 6x = -1$$

$$x^2 - 6x + \left(\frac{-6}{2}\right)^2 = -1 + \left(\frac{-6}{2}\right)^2$$

$$x^2 - 6x + 9 = -1 + 9$$

$$x^2 - 6x + 9 = 8$$

$$(x - 3)(x - 3) = 8$$

$$(x - 3)^2 = 8$$

$$x - 3 = \pm\sqrt{8}$$

$$x = \pm 2\sqrt{2} + 3$$

Problem 8

Solve: $\sqrt{3x+1} = x - 1$

To solve the equation $\sqrt{3x+1} = x - 1$, we follow these steps:

Isolate the square root:

$$\sqrt{3x+1} = x - 1$$

Square both sides to eliminate the square root:

$$(\sqrt{3x+1})^2 = (x-1)^2$$

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

Expand the right-hand side:

$$3x + 1 = (x-1)(x-1)$$

$$3x + 1 = x^2 - 2x + 1$$

Move all terms to one side to form a quadratic equation:

$$3x + 1 - 1 = x^2 - 2x + 1 - 1$$

$$3x = x^2 - 2x$$

$$0 = x^2 - 2x - 3x$$

$$0 = x^2 - 5x$$

Factor the quadratic equation:

$$0 = x(x-5)$$

Solve for x using the zero product rule:

$$x = 0 \quad \text{or} \quad x = 5$$

Check the solutions in the original equation:

For $x = 0$:

$$\sqrt{3(0)+1} = 0 - 1$$

$$\sqrt{1} = -1$$

$$1 \neq -1$$

Therefore, $x = 0$ is not a solution.

For $x = 5$:

$$\sqrt{3(5)+1} = 5 - 1$$

$$\sqrt{16} = 4$$

$$4 = 4$$

Therefore, $x = 5$ is a solution.

Thus, the solution to the equation $\sqrt{3x+1} = x - 1$ is:

$$\boxed{5}$$

Problem 9

Solve: $\frac{x}{x-3} + \frac{3}{x+3} = \frac{6x}{x^2-9}$

To solve the equation

$$\frac{x}{x-3} + \frac{3}{x+3} = \frac{6x}{x^2-9},$$

we will follow these steps:

Identify a common denominator:

$$x^2 - 9 = (x-3)(x+3).$$

Rewrite each term with the common denominator:

$$\frac{x(x+3)+3(x-3)}{(x-3)(x+3)} = \frac{6x}{(x-3)(x+3)}.$$

Combine the terms on the left side:

$$\frac{x(x+3)+3(x-3)}{(x-3)(x+3)} = \frac{6x}{(x-3)(x+3)}.$$

Simplify the numerator on the left side:

$$x(x+3)+3(x-3) = x^2+3x+3x-9 = x^2+6x-9.$$

Rewrite the equation:

$$\frac{x^2+6x-9}{(x-3)(x+3)} = \frac{6x}{(x-3)(x+3)}.$$

Since the denominators are the same, equate the numerators:

$$x^2+6x-9 = 6x.$$

Subtract $6x$ from both sides:

$$x^2-9 = 0.$$

Solve the quadratic equation:

$$x^2-9 = (x-3)(x+3) = 0.$$

Thus, the solutions are:

$$x = 3 \quad \text{or} \quad x = -3.$$

Check for any extraneous solutions by substituting back into the original equation:

For $x = 3$:

$$\frac{3}{3-3} + \frac{3}{3+3} = \frac{6 \cdot 3}{3^2-9}$$

This results in division by zero, so $x = 3$ is not a valid solution.

For $x = -3$:

$$\frac{-3}{-3-3} + \frac{3}{-3+3} = \frac{6 \cdot (-3)}{(-3)^2 - 9}$$

This also results in division by zero, so $x = -3$ is not a valid solution.

Therefore, the equation

$$\frac{x}{x-3} + \frac{3}{x+3} = \frac{6x}{x^2 - 9}$$

has no solutions.

Problem 10

What are the 4 ways of solving a quadratic?

Factoring, Square Root Method, Complete the Square, Quadratic Formula

Problem 11

Multiple Choice: Which method would be ideal to solve:

$$x^2 = 100$$

B) Square Root Method

Problem 12

Multiple Choice: Which method would be ideal to solve:

$$x^2 + 4x - 1 = 0$$

C) Complete the Square

Problem 13

Multiple Choice: Which method would be ideal to solve:

$$x^2 + 5x + 6 = 0$$

A) Factoring

Problem 14

Multiple Choice: Which method would be ideal to solve:

$$2x^2 - 7x + 1 = 0$$

D) Quadratic Formula