

Problem 1 Simplify the following expression

[/ 8 marks]

$$1) \frac{\sqrt{72} + \sqrt{18}}{\sqrt{81}} = \frac{6\sqrt{2} + 3\sqrt{2}}{9} = \sqrt{2} \quad 2) \frac{(2 + \sqrt{2})^2 - (2 - \sqrt{2})^2}{2} = 4\sqrt{2}$$

Problem 2 Solve the second degree equations

[/ 8 marks]

$$1) 2x^2 - 3x - 2 = 0 \quad \Delta = 25 \quad S = \left\{ \frac{3 \pm 5}{4} \right\} = \left\{ -\frac{1}{2}, 2 \right\}$$

$$2) 3x^2 - 19x + 6 = 0 \quad \Delta = 289 \quad S = \left\{ \frac{19 \pm 17}{6} \right\} = \left\{ \frac{1}{3}, 6 \right\}$$

Problem 3 Solve the following logarithmic equations

[/ 12 marks]

$$1) 2\log_4(x-1) = \log_4(16)$$

$$2\log_4(x-1) = 2$$

$$\log_4(x-1) = 1$$

$$x-1=4 \Rightarrow \boxed{x=5}$$

$$2) \log_2(x-4) + \log_2(x+4) = 3$$

$$(x-4)(x+4) = 2^3$$

$$x^2 - 16 = 8$$

$$\boxed{x = \sqrt{24} = 2\sqrt{6}}$$

$$3) \log_4((x-2)^2) = 3$$

$$\log_4(x-2) = \frac{3}{2}$$

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

$$\boxed{x=10}$$

$$4) \log_7(14x) - \log_7(x-5) = 2$$

$$\log_7\left(\frac{14x}{x-5}\right) = 2$$

$$\frac{14x}{x-5} = 7^2 = 49 \quad 14x = 49(x-5)$$

$$\boxed{x=7}$$

$$5) \log_3^2(x) - 7\log_3(x) + 6 = 0$$

$$l^2 - 7l + 6 = 0$$

$$\Delta = 25 \quad l = \frac{7 \pm 5}{2} \quad \boxed{x = 3^6 \text{ or } x = 3}$$

$$6) \log_2(2x^2 - 3x + 2) = 2$$

$$2x^2 - 3x + 2 = 4$$

$$2x^2 - 3x - 2 = 0 \quad \Delta = 25$$

$$\text{as saw in Probl 1): } x = -\frac{1}{2} \text{ or } x = 2$$

$$\text{but 2 is not accepted then } \boxed{x = -\frac{1}{2}}$$

Problem 4 Solve the following equations

[/ 12 marks]

$$1) \frac{4^{2-\frac{x}{2}}}{8} = 8 \Rightarrow 4^{2-\frac{x}{2}} = 64 \Rightarrow 2-\frac{x}{2} = 3 \Rightarrow \boxed{x = -2}$$

$$2) \sqrt{2^{x-8}} = 32^{x+1} \quad 2^{\frac{x-8}{2}} = 2^{5(x+1)} \Rightarrow \frac{x-8}{2} = 5x+5 \quad \boxed{x = -2}$$