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Chapter 14 Problem Solving - set A

Bronze:

$$6^{3x-2} = 23$$

$$\log_6(6^{3x-2}) = \log_6(23)$$

$$3x-2 = \log_6(23)$$

$$3x-2 = 1.74995$$

$$3x = 3.74995$$

$$x = 1.25$$

Silver:

a) $u = 3^x$

$$9^x - 3^{x+2} + 20 = 0$$

$$(3^2)^x - 3^x \times 3^2 + 20 = 0$$

$$(3^x)^2 - 9 \times 3^x + 20 = 0$$

$$u = 3^x$$

$$u^2 - 9u + 20 = 0$$

b) $a=1$ $\frac{9 \pm \sqrt{(-9)^2 - 4(1)(20)}}{2(1)} = \frac{9 \pm \sqrt{81-80}}{2} = \frac{9 \pm 1}{2}$

$b=-9$

$c=20$ $u=5$ or $u=4 \rightarrow 3^x=5, 3^x=4$

$x = \log_3 4$ or $x = \log_3 5$

Gold:

$$4^{2x} - 2^{2x+3} + 12 = 0$$

$$(2^2)^{2x} = 2^{4x} - 8 \times 2^{2x} + 12 = 0 \quad \text{let } y = 2^{2x}$$

$$y^2 - 8y + 12 = 0 \rightarrow (y-6)(y-2) = 0$$

$$y = 6 \text{ or } y = 2$$

$$\log_2(2^{2x}) = \log_2(6)$$

$$x = \frac{\log_2 6}{2 \log_2 2}$$

$$y = 2 \rightarrow \log_2(2^{2x}) = \log_2(2)$$

$$2x = 1$$

$$x = \frac{1}{2}$$