

**Examen de Matemáticas 1º de Bachillerato CS**  
**Octubre 2013**

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**Problema 1** Simplifica todo lo que puedas

$$2\sqrt{147} - \frac{1}{3}\sqrt{48} + 5\sqrt{108}, \quad \frac{\sqrt{7^3 \sqrt{2}}}{\sqrt[3]{7}}$$

**Solución:**

$$2\sqrt{147} - \frac{1}{3}\sqrt{48} + 5\sqrt{108} = \frac{128\sqrt{3}}{3}, \quad \frac{\sqrt{7^3 \sqrt{2}}}{\sqrt[3]{7}} = \sqrt[6]{14}$$

**Problema 2** Racionalizar las siguientes expresiones:

$$\frac{1}{1 + \sqrt{5}}; \quad \frac{2}{\sqrt[6]{3^5}}; \quad \frac{\sqrt{3}}{\sqrt{2} - \sqrt{7}}$$

**Solución:**

$$\frac{1}{1 + \sqrt{5}} = -\frac{1 - \sqrt{5}}{4}; \quad \frac{2}{\sqrt[6]{3^5}} = \frac{2\sqrt[6]{3}}{3}, \quad \frac{\sqrt{3}}{\sqrt{2} - \sqrt{7}} = -\frac{\sqrt{6} - \sqrt{21}}{5}$$

**Problema 3** Resolver las ecuaciones:

1.  $\log(2 - x) - \log(x + 1) = 1$
2.  $\log(5 - x^2) - \log x = 1 + \log(x - 1)$
3.  $2\log(3 - x) - 1 = \log x$
4.  $3^{x^2 - 5x - 1} = 27$

**Solución:**

1.  $\log(2 - x) - \log(x + 1) = 1 \implies \log \frac{2 - x}{x + 1} = \log 10 \implies$

$$11x = -8 \implies x = -\frac{8}{11}.$$

2.  $\log(5 - x^2) - \log x = 1 + \log(x - 1) \implies \log \frac{5 - x^2}{x} = \log 10(x - 1) \implies$   
 $11x^2 - 10x - 5 = 0 \implies x = 1, 267661082, x = -0, 3585701736$ (no vale).

3.  $2\log(3 - x) - 1 = \log x \implies x^2 - 16x + 9 = 0 \implies x = 0, 5838015129, x = 15, 41619848$ (no vale).

4.

$$3^{x^2-5x-1} = 27 \implies x^2 - 5x - 4 = 0 \implies \begin{cases} x = 5,701562118 \\ x = -0,7015621187 \end{cases}$$

**Problema 4** Factoriza los siguientes polinomios:

1.  $P(x) = x^3 - 3x^2 - 13x + 15$

2.  $Q(x) = x^3 - 8x^2 + 21x - 18$

3.  $R(x) = 3x^5 + 7x^4 - 7x^3 - 15x^2 + 8x + 4$

**Solución:**

1.  $P(x) = x^3 - 3x^2 - 13x + 15 = (x - 1)(x + 3)(x - 5)$

2.  $Q(x) = x^3 - 8x^2 + 21x - 18 = (x - 2)(x - 3)^2$

3.  $R(x) = 3x^5 + 7x^4 - 7x^3 - 15x^2 + 8x + 4 = (x - 1)^2(x + 2)^2(3x + 1)$

**Problema 5** Resolver y simplificar:

$$\frac{x-1}{x+3} - \frac{5x-2}{x^2+2x-3} = \frac{x+3}{x-1}$$

**Solución:**

$$\frac{x-1}{x+3} - \frac{5x-2}{x^2+2x-3} = \frac{x+3}{x-1} \implies x = -\frac{6}{13}$$

**Problema 6**

$$x^4 - 7x^2 - 18 = 0$$

**Solución:**

Hacemos  $z = x^2 \implies z^2 - 7z - 18 = 0 \implies z = 9$  y  $z = -2$ .

$$z = 9 = x^2 \implies x = \pm 3$$

$$z = -2 = x^2 \implies \text{no tiene solución}$$