

Tema 4

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Exercitiul 1 / Pag. 5

B

$$\Delta r = 0.5 * \text{precizie}$$

$$\Delta r = 0.5 * 0.02 \text{ cm} = 0.01 \text{ cm}$$

$$\Delta L_{\text{cerc}} = 2\pi\Delta r$$

$$\Delta L_{\text{cerc}} = 2 * 3.14 * 0.01 \text{ cm} = 0.0628 \text{ cm}$$

$$2\pi\Delta r \leq 0.02 \text{ cm}$$

$$2 * 3.14 * 0.01 \text{ cm} \leq 0.02 \text{ cm}$$

D

$$\Delta f = \sqrt{(\partial f / \partial r * \Delta r)^2 + (\partial f / \partial h * \Delta h)^2}$$

Avem:

$$f = \pi r^2 h / 3$$

$$\partial f / \partial r = 2\pi r h / 3$$

$$\partial f / \partial h = \pi r^2 / 3$$

$$\Delta r = 0.003$$

$$\Delta h = 0.001$$

Obținem:

$$\Delta f = \sqrt{(2\pi r h / 3 * 0.003)^2 + (\pi r^2 / 3 * 0.001)^2}$$

$$\Delta f = \sqrt{(2\pi * 2 * 2/3 * 0.003)^2 + (\pi * 2^2/3 * 0.001)^2}$$

$$\Delta f = \sqrt{0.00009072 + 0.00000107}$$

$$\Delta f = \sqrt{0.00009179}$$

$$\Delta f \approx 0.00958$$

Marginea erorii relative δf este dată de:

$$\delta f = \Delta f / f$$

Obținem:

$$\delta f = 0.00958 / (\pi * 2^2 * 2/3)$$

$$\delta f \approx 0.0287$$

Exercitiul 6 / Pag. 8

B

$$x = 5.32 \pm 0.02 \text{ cm}$$

$$y = 0.103 \pm 0.001 \text{ s}$$

Calculam:

$$g = 2x^2/y^2$$

$$g = 2(5.32 \text{ cm} \pm 0.02 \text{ cm})^2 / (0.103 \text{ s} \pm 0.001 \text{ s})^2$$

$$g = 109.6517 \text{ cm}^2/\text{s}^2 \pm 4.3668 \text{ cm}^2/\text{s}^2$$

Eroarea relativa:

$$\delta g/g = (\delta x/x)^2 + 4(\delta y/y)^2$$

unde δx și δy sunt necunoscutele x și y .

$$\delta g/g = [(0.02 \text{ cm})/(5.32 \text{ cm})]^2 + 4[(0.001 \text{ s})/(0.103 \text{ s})]^2$$

$$\delta g/g = 0.000524$$

Eroarea relativa in g este 0.0524 (5.24%).

Exercitiul 7 / Pag. 10

```
k1 = 5;
n1 = [10,25];
I1 = integrala(n1,k1);
subplot(2,2,1);
plot(1:n1(1),I1(1),'-o');
title(['k=',num2str(k1),' , n=',num2str(n1(1))]);
subplot(2,2,2);
plot(1:n1(2),I1(2),'-o');
title(['k=',num2str(k1),' , n=',num2str(n1(2))]);
k2 = 0.25;
n2 = [20,50];
I2 = integrala(n2,k2);
subplot(2,2,3);
plot(1:n2(1),I2(1),'-o');
title(['k=',num2str(k2),' , n=',num2str(n2(1))]);
subplot(2,2,4);
plot(1:n2(2),I2(2),'-o');
title(['k=',num2str(k2),' , n=',num2str(n2(2))]);

function I = integrala(n,k)
    I = zeros(1,max(n));
    I(1) = log(k+1)-log(k); % I0
    for i=2:max(n)
        I(i) = 1/i - k*I(i-1); % relația de recurență
    end
    I = I(n); % selectează valorile corespunzătoare lui n
end
```

Figure 1

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