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1.1

a. $\Delta a = |a^* - \bar{a}| = 0,05$; $\delta a = \left|\frac{\Delta a}{a^*}\right| = \left|\frac{0,05}{0,9}\right| = 5,56\%$

b. $\Delta b = |b^* - \bar{b}| = 0,06$; $\delta b = \left|\frac{\Delta b}{b^*}\right| = \left|\frac{0,06}{5,21}\right| = 1,151\%$

c. $\Delta c = |c^* - \bar{c}| = 24$; $\delta c = \left|\frac{\Delta c}{c^*}\right| = \left|\frac{24}{15000}\right| = 0,16\%$

d. $\Delta d = |d^* - \bar{d}| = 2$; $\delta d = \left|\frac{\Delta d}{d^*}\right| = \left|\frac{2}{30}\right| = 6,666\%$

1.2

a. $\bar{a} = 3,01$ hoặc $3,11$; $\delta a = \left|\frac{\Delta a}{a^*}\right| = \left|\frac{0,35}{3,56}\right| = 9,83\%$

b. $\Delta b = 0,08125$; $\bar{b} = 2,29825$ hoặc $2,21125$

c. $\Delta c = 0,05 * 1,156 = 0,0578$; $c^* = 1,0982$ hoặc $1,2138$

d. $a^* = \frac{2480}{\gamma}$; $\bar{a} = 350,586$ hoặc $358,006$

1.4

a. $\Delta A = |a|\Delta x + |2by|\Delta y + |\cos 3z^2|\Delta z$

$\delta A = \left|\frac{\Delta A}{A}\right| = \frac{|a|\Delta x + |2by|\Delta y + |3z^2/c|\Delta z}{|ax + by^2 + z^3|}$

b. $\Delta B = \left|\frac{a+by}{(x+y)^2}\right|(\Delta x + \Delta y) + \left|\frac{-2c}{z^3}\right|\Delta z$; $\delta B = \frac{\Delta B}{B} = \frac{\left|\frac{a+b}{(x+y)^2}\right|(\Delta x + \Delta y) + \left|\frac{-2c}{z^3}\right|\Delta z}{\frac{a+b}{x+y} + \frac{c}{z^2}}$

~~c. $\Delta c = a\sin bx - y\cos cz$~~

c. $\Delta c = |ab\cos bx|\Delta x + |\cos cz|\Delta y + |cy\sin cz|\Delta z$

$\delta c = \frac{|ab\cos bx|\Delta x + |\cos cz|\Delta y + |cy\sin cz|\Delta z}{|a\sin bx - y\cos cz|}$

(2)

$$\frac{\delta x}{\delta D} = \left| \frac{a\sqrt{x^2+y^2+z^2} - (ax+by+cz)\frac{x}{\sqrt{x^2+y^2+z^2}}}{(x^2+y^2+z^2)} \right| = \left| \frac{a(x^2+y^2+z^2) - (ax+by+cz)x}{(x^2+y^2+z^2)\sqrt{x^2+y^2+z^2}} \right|$$

$$\frac{\delta y}{\delta D} = \left| \frac{b(x^2+y^2+z^2) - (ax+by+cz)y}{(x^2+y^2+z^2)\sqrt{x^2+y^2+z^2}} \right|$$

$$\frac{\delta z}{\delta D} = \left| \frac{c(x^2+y^2+z^2) - (ax+by+cz)z}{(x^2+y^2+z^2)\sqrt{x^2+y^2+z^2}} \right|$$

$$\Delta D = \left| \frac{1}{(x^2+y^2+z^2)\sqrt{x^2+y^2+z^2}} \right| \left(\left| a(x^2+y^2+z^2) - x(ax+by+cz) \right| \Delta x + \left| b(x^2+y^2+z^2) - y(ax+by+cz) \right| \Delta y + \left| c(x^2+y^2+z^2) - z(ax+by+cz) \right| \Delta z \right)$$

$$\Delta D = \frac{\left| a(x^2+y^2+z^2) - x(ax+by+cz) \right| \Delta x + \left| b(x^2+y^2+z^2) - y(ax+by+cz) \right| + \left| c(x^2+y^2+z^2) - z(ax+by+cz) \right| \Delta z}{\sqrt{(x^2+y^2+z^2)(ax+by+cz)}}$$

(5) 1.6

a. $S = \pi R^2 = 0,5568$

$\Delta S = |2\pi R| \Delta R = 2,645 \cdot 10^{-3}$

$S = 0,568 \pm 2,645 \cdot 10^{-3}$

b: $x = 0,4728 \pm 4,898 \cdot 10^{-6}$ (Rad.)

$y = \sin x = 0,9559$

$\Delta y = \cos x \, \Delta x = 2,483 \cdot 10^{-4}$

$\Rightarrow \sin x = 0,9559 \pm 2,483 \cdot 10^{-4}$

c: $V = \pi R^2 h$

$\Delta V = |2\pi R h| \Delta R + |\pi R^2| \Delta h$

$0,1 = |12\pi \cdot 2| \Delta R + |\pi R^2| \Delta h$

$= 12\pi \Delta R + 4\pi \Delta R$

d. $S_t = a \cdot b = 15 (m^2)$; $\Delta S_t = a \Delta b + b \Delta a = 0,5 + 0,6 = 1,1$

$\Rightarrow S_t = 15 \pm 1,1 (m^2)$

$S_b = ac + bc = 12,5 + 2,5 = 20 (m^2)$; $\Delta S_b = c \Delta a + a \Delta b + (a+b) \Delta c = 1,575$

$\Rightarrow S_b = 1,575$

$S_{tp} = S_t + S_b = 35 \pm 2,615 (m^2)$

$V = abc$; $\Delta V = bc \Delta a + ac \Delta b + ab \Delta c = 5$

$V = abc = 32,5 (m^3)$

$\Rightarrow V = 32,5 \pm 5 (m^3)$

1.10

$U^2 = U_R^2 + U_C^2 = 2500 \Rightarrow U = 50$

~~$2U\Delta U =$~~

$2U\Delta U = 2U_R \Delta U_R + 2U_C \Delta U_C$

$\Leftrightarrow U\Delta U = U_R \Delta U_R + U_C \Delta U_C$

$\Leftrightarrow 50 \cdot \Delta U = 14 \cdot 1 + 48 \cdot 1 \Rightarrow \Delta U = 1,24$

$\Rightarrow U = 50 \pm 1,24 \ (V)$

1.8

a. Nhiên đã lấy thêm: $\left|\frac{500000 - 369200 - 130000}{500000}\right| = 0 \cdot 10^{-9}$.
$= 0{,}00\%$.

b. $\left|\frac{500000 - 369200 - 1000000}{500000}\right| = 0{,}06\%$ => chấp nhận được.

1.9.

$T = 2\pi\sqrt{\frac{m}{k}} \Rightarrow k = \frac{4\pi^2 m}{T^2} = 4\pi^2 T^{-2} m$

$m = 100\,g \pm 2\% = 100\,g \pm 2g$

$T = 2s \pm 1\% = 2s \pm 0{,}02s$.

$\Delta k = \left|\frac{4\pi^2}{T^2}\right| \Delta m + \left|-8\pi^2 T^{-3} m\right| \Delta T$.

$\Delta k = 1{,}9934$.