How to find $\Delta(C\mu_0 NI)$, by Matthew S. Norton

We have

$$b = \log\left[\frac{C\mu_0 NI}{2a}\right] \tag{1}$$

Solve this for $C\mu_0 NI$

$$C\mu_0 NI = 2a10^b \tag{2}$$

We have to use the annoying equation on page A-9 of your lab book

$$\Delta f = \sqrt{\left(\frac{\partial f}{\partial x_1} \Delta x_1\right)^2 + \left(\frac{\partial f}{\partial x_2} \Delta x_2\right)^2} \tag{3}$$

For our case here, $f = C\mu_0 NI$, (I'll just call it x in the calculations) $x_1 = b$, and $x_2 = a$. So we have

$$\Delta x = \sqrt{\left(\frac{\partial x}{\partial b}\Delta b\right)^2 + \left(\frac{\partial x}{\partial a}\Delta a\right)^2} \tag{4}$$

Now

$$\frac{\partial x}{\partial b} = 2\ln(10)a10^b \tag{5}$$

$$\frac{\partial b}{\partial a} = 2 \cdot 10^b \tag{6}$$

Which simplifies to

$$\Delta x = \sqrt{\left[\Delta b \cdot (2\ln(10)a10^b)\right]^2 - \left[\Delta a \cdot (2 \cdot 10^b)\right]^2}$$
(7)

Putting $C\mu_0 NI$ back in, we get

$$\Delta (C\mu_0 NI) = \sqrt{[\Delta b \cdot (2\ln(10)a10^b)]^2 - [\Delta a \cdot (2 \cdot 10^b)]^2}$$
(8)

Where a is the radius of the coil, Δa is the uncertainty in the radius of the coil, either ± 0.5 mm or ± 1.0 mm, your choice, b is the y-intercept, and Δb is what you get from the LINEST function as the uncertainty in the y-intercept.