$y_0 = -20,000$

$y = y_0 e^{-0.03t} + 20,000$

b.) $\frac{90}{100} \times 20,000 = 18,000$

$y = 18,000$

$y = -20000\, e^{-0.03t} + 20,000$

$18,000 = -20,000\, e^{-0.03t} + 20000$

$18000 - 20000 = -20000\, e^{-0.03t}$

$-2000 = -20000\, e^{-0.03t}$

$\frac{-2000}{-2000} = e^{-0.03t}$

$0.1 = e^{-0.03t}$

$\ln(0.1) = -0.03t$

$-2.30 = -0.03t$

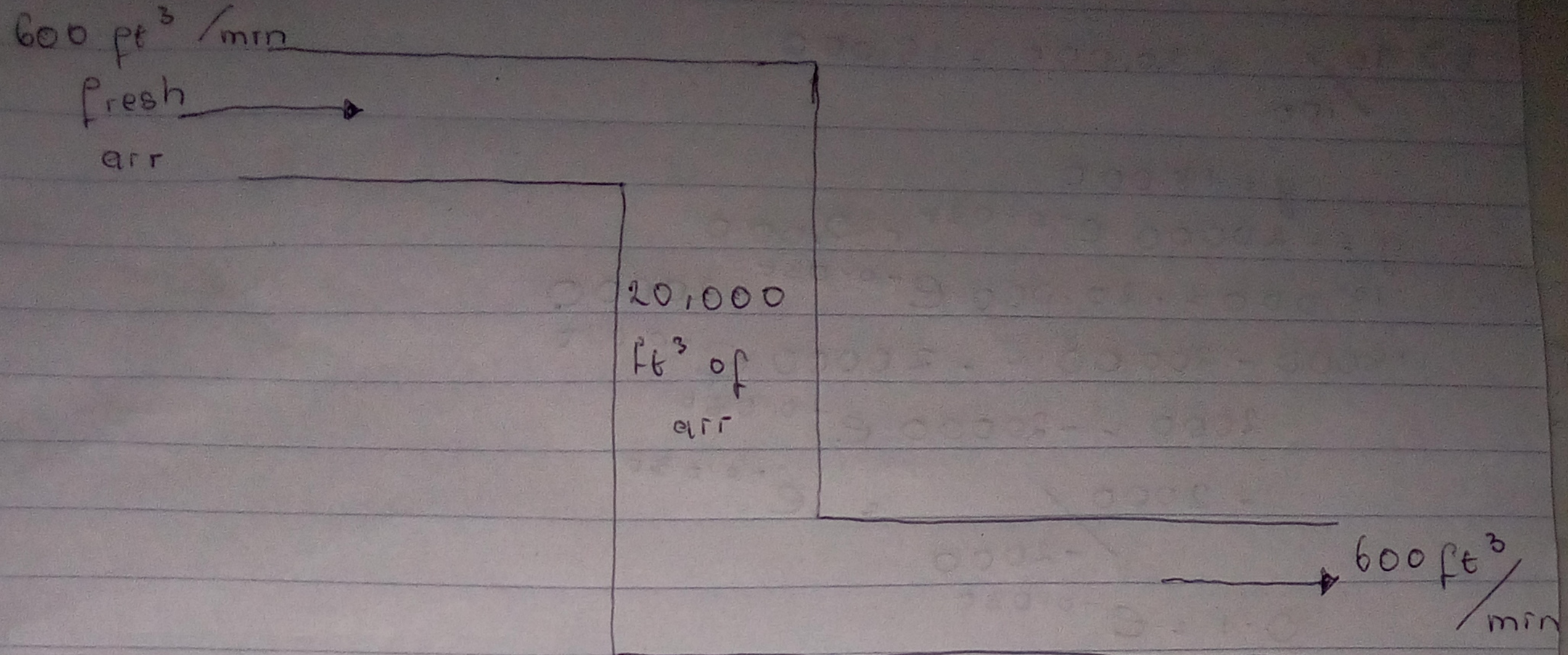
$t = \frac{-2.30}{-0.03}$

$t = 76.6$ hours

c.) graph.

d.) graph

e.) $\frac{du}{dt}$ decreases over time i.e the rate at which fresh air is deposited in the room tends to Zero.



$$\frac{dy}{dt} = y_{in} - y_{out}$$

$$y_{in} = 600$$

$$y_{out} = 600 / 20{,}000 = 0.03y$$

$$\frac{dy}{dt} = 600 - 0.03y$$

$$\frac{dy}{dt} = -0.03(y - 20{,}000)$$

$$\int \frac{dy}{(y - 20{,}000)} = \int -0.03\,dt$$

$$\ln(y - 20{,}000) = -0.03t + c$$

$$y - 20{,}000 = e^{-0.03t+c}$$

$$y - 20000 = e^{-0.03t} \cdot e^{c}$$

let

$$e^{c} = y_0$$

$$y - 20000 = y_0 e^{-0.03t}$$

$$y = y_0 e^{-0.03t} + 20{,}000$$

a.) At $t = 0$, $y = 0$

$$y = y_0 e^{0.03t} + 20{,}000$$

$$0 = y_0 e^{-0.03(0)} + 20{,}000$$

Book1 - Microsoft Excel

Home Insert Page Layout Formulas Data Review View

Page Layout | Page Break Preview | Custom Views | Full Screen — Workbook Views

Ruler | Gridlines | Message Bar | Formula Bar | Headings — Show/Hide

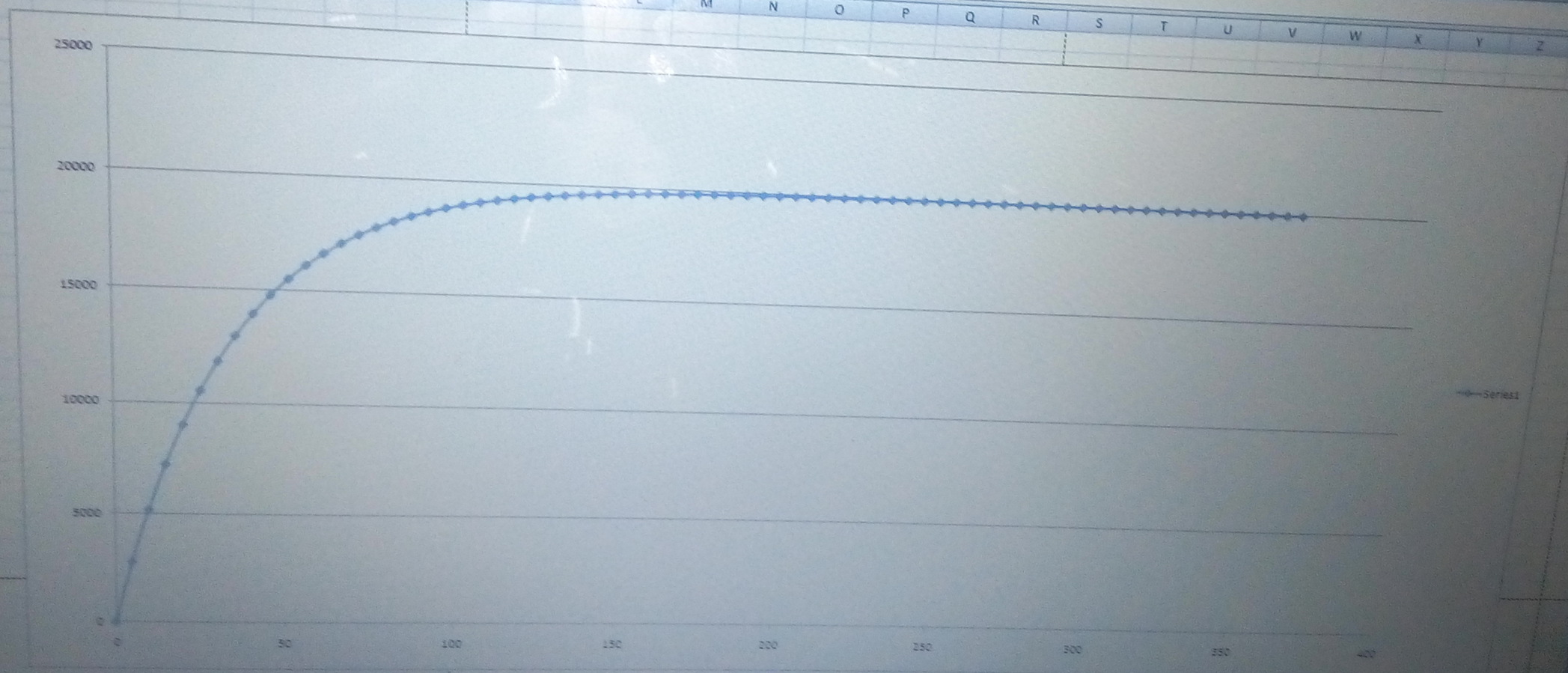
Zoom | 100% | Zoom to Selection — Zoom

New Window | Arrange All | Freeze Panes | Split | Hide | Unhide | View Side by Side | Synchronous Scrolling | Reset Window Position | Save Workspace | Switch Windows — Window

Macros — Macros

B2 =20000-(20000*EXP(-0.03*A2))

A	B
85	18438.4
90	18655.9
95	18843.1
100	19004.3
105	19143
110	19262.3
115	19365.1
120	19453.5
125	19529.6
130	19595.2
135	19651.6
140	19700.1
145	19741.9
150	19777.8
155	19808.8
160	19835.4
165	19858.3
170	19878.1
175	19895
180	19909.7
185	19922.3
190	19933.1
195	19942.4
200	19950.4
205	19957.3
210	19963.3
215	19968.4
220	19972.8
225	19976.6
230	19979.8
235	19982.7
240	19985.1
245	19987.1
250	19988.9
255	19990.5
260	19991.8



Sheet1 Sheet2 Sheet3

Ready

DELL