Homework Assignment #3 Name_____

due in class Friday, September 23

*Cover sheet : Staple this page in front of your solutions.*

Write the requested *answers* (without calculations) on this page;
write the detailed *solutions* on your own paper.

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[11] Problem 2.2.* *Answer: the value of $\beta$ is*

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[12] Problem 2.3.* *Answer: the Reynolds number (part b) is*

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[13] Problem 2.10.** *Answer: the terminal speed is*

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[14] Problem 2.18.* *Answer: the Taylor series for $\ln(1+\delta)$ is*

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[15] Problem 2.26.* *Answer: the time to slow to 15 m/s is*

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[16] The terminal velocity of a drop of water (diameter = D) is the velocity at which $F = mg - bv - cv^2 = 0$.

The parameter values for air at STP are

$b = (1.6 \times 10^{-4})D$ and $c = (0.25)\,D^2$, in MKS units;

also, $m = (0.52 \times 10^{3})\,D^3$ in MKS units.

Determine $v_{ter}$ as a function of D. Plot an accurate graph of $v_{ter}$ versus D, from D = 0.1 mm to 3 mm. (Use a computer to make the plot.) [The result shows why water droplets in a cloud do not fall as rain.]

Hand in the plot.

*Answer here: Explain why water droplets in a cloud do not fall as rain.*

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