

Homework #5

FORMAT of the file to be submitted:

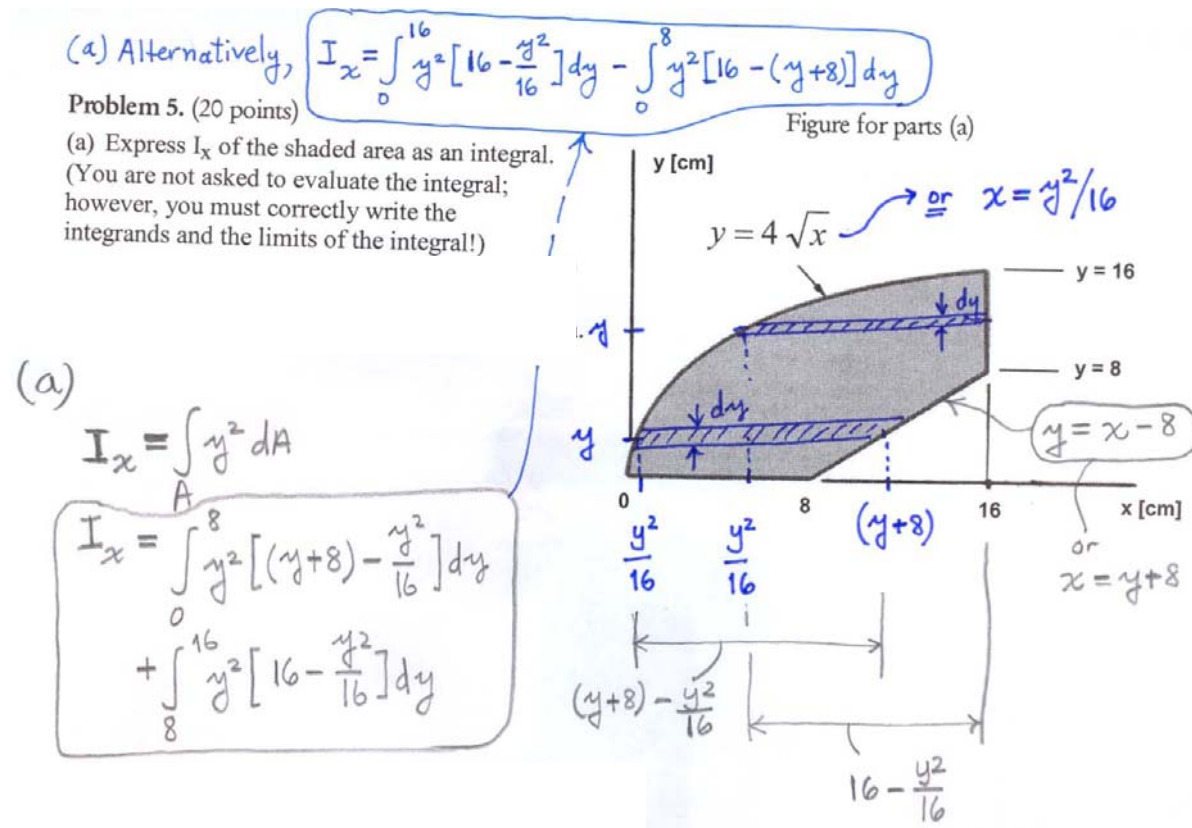
1. All the m-files should be named as pr1.m, pr2.m and so.
2. The results (figure, table, or individual result such as $x = 2.653$, ..., and any comment) should be placed in a WORD file named as yourlastname_HW_04.doc
3. All the m-files should be inserted at the end of the WORD file using COURIER 9 font.
4. The WORD file and all the m-files should ZIPPED together, and the file should be named as yourlastname_HW_05.zip or (yourlastname_HW_05.rar).
5. Place the file to the following folder:
F:\COURSES\UGRADS\MECH\MECH307\HOMEWORK\...

Problem 1.

For what value of a , the following integral is $I = 200$?

$$I = \int_0^a 100 \left[1 - e^{-0.1x} \cos(4x + \pi) \sin(x + 4) \right] dx$$

Problem 2. The following two alternative solutions were given in a MECH201 exam paper. Numerically evaluate either of the solution for I_x .



Problem 3. Given the function:

$$y(x) = 20 + \frac{10\sin(2x)e^{-0.1x}}{\sqrt{1+3x}}$$

(a) Plot y versus x , and dy/dx versus x on $0 \leq x \leq 10$ on two figures side by side (use subplots).

(b) Calculate $I = \int_0^{10} y(x) dx$.

(c) For what value of b , $I = \int_0^b y(x) dx = 80$?

Problem 4

An experimental data was collected as follows:

x [cm]	0	10	20	30	40	50	60	70	80	90	100
y [cm]	200	205	213	220	225	226	221	211	198	183	170

(a) Plot y versus x , and dy/dx versus x on $0 \leq x \leq 100$ on two figures side by side (use subplots).

(b) Calculate $I = \int_0^{100} y(x) dx$.

Problem 5. Calculate the area of an ellipse with $a = 10$ cm and $b = 5$ cm. recall that the equation of an ellipse is given by

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$$

Problem 6.

Find the area of the intersection region where $(x-3)^2 + y^2 \leq 25$ and $y \geq 2 + 3(x-1)^2$.
