

NAME _____

~~Sample~~

QSci 292

WINTER
jjohnson

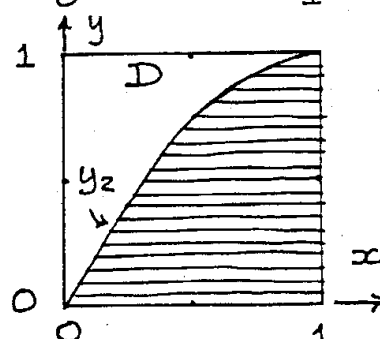
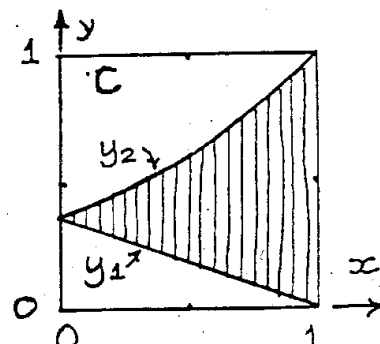
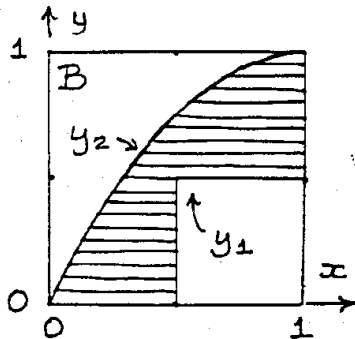
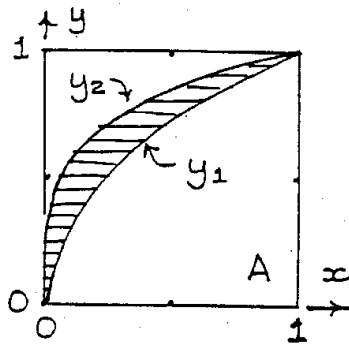
FINAL EXAM

This exam consists of four parts. In the first two, label your choice of problems to be corrected by the letters associated with the areas, i.e. A, B, C or D. In the third and fourth parts, label your choices using the associated problem numbers. Use a star as a label: *. Label the choices on your answer sheet and turn them in with your answers. Put your name on each sheet of paper you turn in.

- In the four unit squares, A - D, shaded areas are shown and below are the functions defining these areas.

Part I: Find the centers of gravity for any 2 of the 4 areas.

Part II: Find the volume of the solids obtained by revolving any 2 of the 4 areas around the x axis.



$$A. \quad y_1 = x^{1/3}$$

$$y_2 = x^{1/6}$$

$$B. \quad y_1 = \begin{cases} 0 & \text{for } x < \frac{1}{2} \\ \frac{1}{2} & \text{for } \frac{1}{2} \leq x \leq 1 \end{cases}$$

$$y_2 = x(2-x)$$

$$C. \quad y_2 = e^{-(1-x)}$$

$$y_1 = (1-x)/e$$

$$D. \quad y_1 = 0$$

$$y_2 = \sin\left(\frac{\pi}{2}x\right)$$

Part III: Find the solutions to 2 of the 4 differential equations and determine the value of the "integration constant" using the initial conditions.

$$1. \frac{dz}{dx} = .54z$$

at $x = 0, z = .48$

$$2. \frac{dw}{dt} = \sqrt{17} t$$

at $t = 0, w = \frac{\sqrt{17}}{2}$

$$3. \frac{dy}{dx} = \frac{1}{5} y(5-y)$$

at $x = 0, y = 1$

$$4. \frac{dp}{dx} = p^{1/3}$$

at $x = 0, p = 0$

Part IV: Evaluate any 4 of the 8 integrals

$$5. \int_0^{\infty} e^{-x} \sin x \, dx$$

$$6. \int_0^{\infty} \frac{dx}{x^5}$$

$$7. \int_{-1}^{+1} \int_{y-2}^{2-y^2} xy \, dx \, dy$$

$$8. \int_{+1}^{+1} \int_{\sqrt{1-x^2}}^4 8x^2 y \, dy \, dx$$

$$9. \int_0^2 \int_0^1 y e^{2x-y^2} \, dy \, dx$$

$$10. \int_0^{\pi/4} \int_0^{\pi/4} \frac{\sin x}{\cos^2 y} \, dy \, dx$$

$$11. \int_0^5 x \ln x \, dx$$

$$12. \int_3^{\infty} \frac{dr}{9+r^2}$$