Math 21B
Kouba
Challenge Sheet 7

1.) SET UP BUT DO NOT EVALUATE integral(s) which represent the area of the region bounded by the graphs of $y = 3x^2 - x^4$ and $y = x^3 + x^2$.

2.) SET UP BUT DO NOT EVALUATE integral(s) which represent the area of the region bounded by the graphs of

    a.) $y = e^{-x}$, $y = x + 1$, and $x = 2$
        i.) using vertical cross-sections.
        ii.) using horizontal cross-sections.

    b.) $y = 3x$ and $y = x^2 - 2x$
        i.) using vertical cross-sections.
        ii.) using horizontal cross-sections.

    c.) $y = \sin x$ and $y = 0$ on the interval $[0, \pi]$
        i.) using vertical cross-sections.
        ii.) using horizontal cross-sections.

3.) The base of a solid is in the xy-plane bounded by the graphs of $y = x^2$ and $y = 2x$. SET UP BUT DO NOT EVALUATE integral(s) which represent the volume of the solid if cross-sections taken perpendicular to the x-axis are

    a.) squares.
    b.) triangles of height 5.
    c.) isosceles right triangles with one edge in the xy-plane.
    d.) semi-circles with diameters in the xy-plane.
   e.) isosceles right triangles with hypotenuse in the xy-plane.

4.) Using the DISC METHOD, SET UP BUT DO NOT EVALUATE integral(s) which represent the volume of the solid formed by revolving the region R, bounded by the given graphs, about the designated line.

    a.) $R : y = e^x$, $x = 0$, and $y = 3$
        i.) about the x-axis
        ii.) about the y-axis
        iii.) about the line $y = 5$
        iv.) about the line $x = -2$

    b.) $R : y = \sqrt{x}$, $y = 0$, and $x = 4$
        i.) about the x-axis
        ii.) about the y-axis
        iii.) about the line $y = -1$
        iv.) about the line $x = 100$

c.) $R : y = x$, $y = 2x$, and $x = 3$
    i.) about the x-axis
    ii.) about the y-axis
    iii.) about the line $y = 6$
    iv.) about the line $x = -1$

5.) Repeat exercise 4.) using the SHELL METHOD.

6.) The region bounded by the graphs of $y = 0$, $x = 0$, and $y = 1 - x$ is revolved about the line $y = 1 - x$. Use any method to compute the volume of this solid.
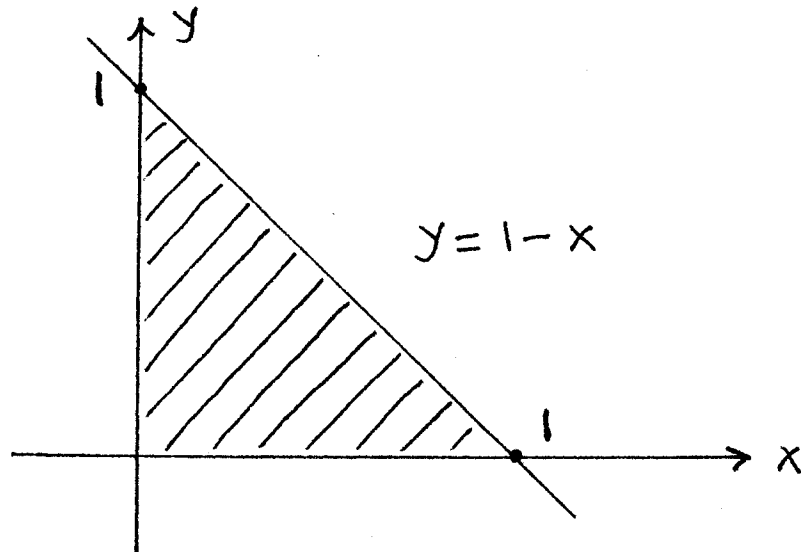
7.) The region bounded by the graphs of $y = x^2$ and $y = x$ is revolved about the line $y = x$. Use any method to compute the volume of this solid.