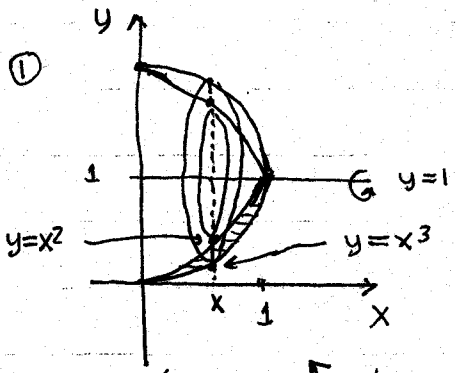
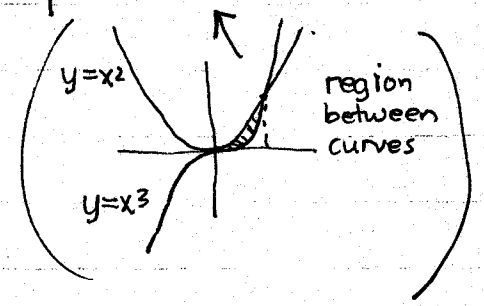
MAT 1505-05/08 01S QUIZ 3 Print Name (Last, First) _____ /10

Show all work on this sheet, including indications of mental steps, in a clearly organized way that speaks for itself. Use proper mathematical notation/syntax. Label parts, box final short answers.

① Set up but do not evaluate an integral for the volume of the solid obtained by rotating the region bounded by the following curves about the specified axis:
$y=x^3$, $y=x^2$ about $y=1$. Begin by drawing a completely labeled diagram that illustrates the problem and gives all the information necessary to set up the integral.

② $\int_0^{\pi/2} 2\pi\cos^2 x\,dx$ represents the volume of a solid. Describe the solid in words and illustrate it with a completely labeled diagram.

① 



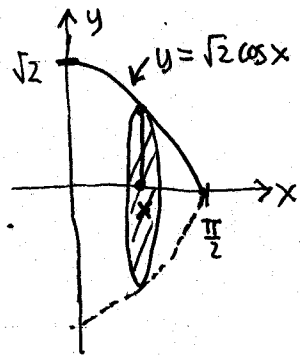
inner radius $R_1(x) = 1-x^2$
outer radius $R_2(x) = 1-x^3$
cross-section area $A(x) = \pi(R_2(x)^2 - R_1(x)^2)$
$= \pi((1-x^3)^2 - (1-x^2)^2)$

$$V = \int_0^1 A(x)\,dx = \boxed{\int_0^1 \pi((1-x^3)^2-(1-x^2)^2)\,dx}$$

simplification: $\pi((1-2x^3+x^6)-(1-2x^2+x^4))$
$= \pi(2x^2-2x^3-x^4+x^6)$

② $\int_0^{\frac{\pi}{2}} 2\pi\cos^2 x\,dx = \int_0^{\frac{\pi}{2}} \pi(\sqrt{2}\cos x)^2\,dx$

$\pi R(x)^2 = A(x)$



Solid obtained by revolving the graph of $y=\sqrt{2}\cos x$ around the x-axis from 0 to $\pi/2$.