AP Calculus AB Mr. Shubleka Quiz: 44

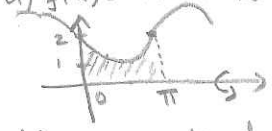
Present neatly on separate paper. Justify for full credit. No Calculators.
Name KEY / SHUBLEKA Score _____ 30 minutes **Weight: x5**

1) Each integral represents the volume of a solid. Describe the solid in as much detail as possible!

a)

$$\int_0^{\pi} \pi(2 - \sin x)^2\,dx$$

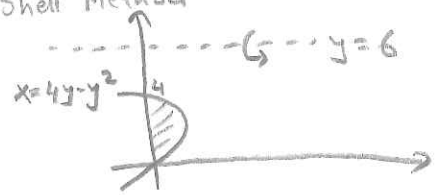
a) $f(x) = 2 - \sin x$ on $[0, \pi]$ about $y = 0$



b)

$$\int_0^4 2\pi(6 - y)(4y - y^2)\,dy$$

b) Shell Method



2) The base of a solid is a circular disk with radius 3. Find the volume of the solid if parallel cross-sections perpendicular to the base are isosceles right triangles with hypotenuse lying along the base.

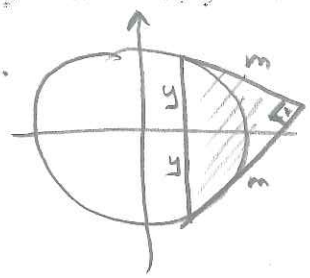
3) Find the area of the region bounded by the given curves.

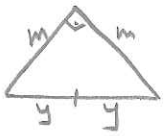
$x + y = 0, \quad x = y^3 + 3y$

4) Find the volume of the solid obtained by rotating the region bounded by the given curves about the specified axis.

$y = x^2 + 1, \; y = 9 - x^2$; about $y = -1$

2.





$m^2 + m^2 = (2y)^2$
$2m^2 = 4y^2$
$m^2 = 2y^2$

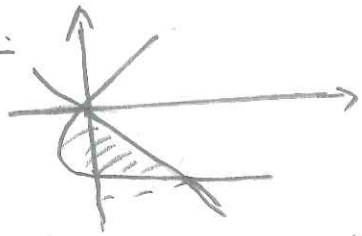
$A(x) = \frac{m \cdot m}{2} = \frac{2y^2}{2} = y^2 = 9 - x^2$

$x^2 + y^2 = 9 \rightarrow y^2 = 9 - x^2$

$V = \int_{-3}^{3} 9 - x^2\,dx = 2\int_0^3 9 - x^2\,dx$

$= 2\left(9x - \frac{x^3}{3}\right)\Big|_0^3 = 2 \cdot \frac{54}{3} = \frac{108}{3}$ c.u. $= 36\,\text{in}^3$

3.



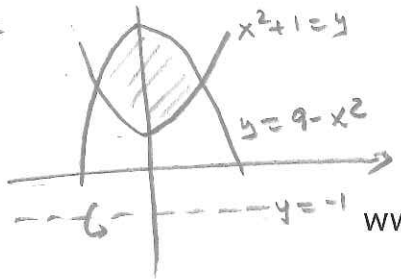
$x = y(y+3) = -y \iff y = 0, \; y = -4$

$A = \int_{-4}^{0} (-y) - (y^2 + 3y)\,dy =$

$= \int_{-4}^{0} -y^2 - 4y\,dy = \left(-\frac{y^3}{3} - 2y^2\right)\Big|_{-4}^{0}$

$= -\frac{64}{3} + 32 = \frac{32}{3}$ s.u.

4.



WASHER $R(x) = 9 - x^2 - (-1) = 10 - x^2$

$r(x) = 1 + x^2 - (-1) = 2 + x^2$

$V = \pi \int_{-2}^{2} (10 - x^2)^2 - (2 + x^2)^2\,dx = 256\pi$ c.u.