AP Calculus BC – Unit 5, Part 1 Required Practice **Name: _____**

5.1 – Required Practice

#1. Find the area enclosed by $y = -x + 1$ and $y = -x^2 + 3x + 1$

#2. Find the area enclosed by $x = -y$ and $x = -y^2 + 2y$

#3. Find the area enclosed by $f(x)=\sqrt[3]{x-1}$ and $g=x-1$

On #4 and #5, sketch the region by hand (no calculator) and find the area enclosed by the curves (integrate by hand).

#4. $y = x^2 - 4x + 3$ and $y = -x^2 + 2x + 3$

On #4 and #5, sketch the region by hand (no calculator) and find the area enclosed by the curves (integrate by hand).

#5. $x = 4 - y^2$ and $x = y - 2$

On the rest of this assignment, sketch the curves and find the area enclosed (use your calculator for the sketch and the integral evaluation).

#6. $y = 3x^3 - 3x$ and $y = 0$

#7. $y = x^2 - 1,\ y = -x + 2,\ x = 0,$ and $x = 1$

#8. $x = y^2$ and $x = y + 2$

#9. $y = \sin(x)$ and $y = \cos(2x)$ $-\frac{\pi}{2} \le x \le \frac{\pi}{6}$

5.2 – Required Practice

#1. Find the volume of the solid obtained by rotating the region bounded by the given curves about the specified line.

$y=x^2$, y-axis, $y=4$, in the first quadrant;
about the $y-axis$

#2. $y=x^2$, y-axis, $y=4$, in the first quadrant;
about the x-axis

#3. $y=x^2$, y-axis, $y = 4$, in the first quadrant;
about y = - 2

#4. $y = x^2$, $x = y^2$; about $x = -1$

#5. Set up, but **do not evaluate**, an integral for the volume of the solid obtained by rotating the region bounded by the given curves about the specified line.

$y = 0, \quad y = \sin x, \quad 0 \le x \le \pi; \quad$ about $y = -2$

#6. $y = x^2$, y-axis, $y = 4$, in the first quadrant; about y = - 3

Sketch and find the volume (use your calculator for the sketch and the integral evaluation).

#7. $y = 3x + 5,\ x = 2,\ x = 7,\ y = 0$ *about the* $x-$*axis*

#8. $y = x^2 + 4,\ x = 0,\ y = 8$ *about the* $y-$*axis*

#9. $y = x^2,\ y = \sqrt{x}$ *about the* $x-$*axis*

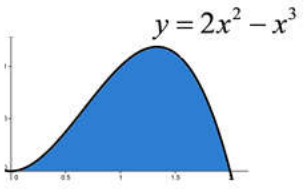
#10. $y = 2x + 3,\ x = 0,\ y = 9$ *around* $y = 9$

#11. $y = -2x + 8,\ y = 0,\ x = 0$ *around* $x = 5$

#12. $y = -2x + 8,\ y = 0,\ x = 0$ *around* $y = 9$

5.3 – Required Practice

#1. Find volume of solid obtained by rotating about the y-axis



#2. Use the method of cylindrical shells to find the volume generated by rotating the region bounded by the given curves about the y-axis. Sketch the region and a typical shell.

$$y = x^2 - 6x + 10, \quad y = -x^2 + 6x - 6$$

#3. Use the method of cylindrical shells to find the volume generated by rotating the region bounded by the given curves about the x-axis. Sketch the region and a typical shell.

$x = \sqrt{y}, \quad x = 0, \quad y = 1$

#4. Use the method of cylindrical shells to find the volume generated by rotating the region bounded by the given curves about the specified axis. Sketch the region and a typical shell.

$y = x^2, \quad y = 0, \quad x = 1, \quad x = 2; \quad$ about $x = 4$

#5. Set up, but **do not evaluate**, an integral....

$$x = \sqrt{\sin y}, \quad 0 \le y \le \pi, \quad x = 0; \quad \text{about } y = 4$$

#6. Use a graph to estimate the x-coordinates of the points of intersection of the given curves. Then use this information to estimate the volume of the solid obtained by rotating about the y-axis the region enclosed by these curves.

$$y = x^4, \quad y = 3x - x^3$$

Sketch and find the volume using shell method (use your calculator for the sketch and the integral evaluation).

#7. $y = 3x + 5, \quad x = 0, \quad x = 7, \quad y = 0 \qquad around\ the\ y-axis$

#8. $y = x^2 + 4, \quad x = 0, \quad y = 7 \qquad around\ the\ x-axis$

#9. $y = 2x + 3, \quad x = 0, \quad y = 9 \qquad around \ y = 9$

#10. $y = x^2 - 4x + 9, \quad y = 2x + 1 \qquad around \ x = 1$

#11. $y = \frac{10}{x^2}, \quad y = 0, \quad x = 1, \quad x = 5 \qquad around\ the\ y-axis$

a) using Disk method…

b) using Shell method…

#12. $y = \frac{1}{x}, \quad y = 0, \quad x = 1, \quad x = 2 \qquad around\ the\ x-axis$

a) using Disk method…

b) using Shell method…

Unit 5 Part 1 Test Review

For #1-4, find the area bounded by the given curves. **Sketch and setup the integral, but do not evaluate the integral.**

#1) $y = x^3, \quad y = x^2 - 4x + 4, \quad x = 2$

#2) $x - 2y + 7 = 0, \quad y^2 - 6y - x = 0$

#3) $y = e^{-x^2}, \quad y = 1 - \cos x, \quad x = 0$

#4) $y = 2^x, \quad y = 8, \quad x = 0$

For #5-8, use the **disk** method to find the volume generated by rotating the region bounded by the given curves about the specified axis. **Sketch and setup the integral, but do not evaluate the integral.**

#5) $y = x^2, \quad y = 4, \quad x = 0; \quad$ *about the* $x-$*axis*

#6) $y = e^{-2x}, \quad y = 1 + x, \quad x = 1, \quad$ *about the* $x-$*axis*

#7) $y = x^3, \quad y = 8, \quad x = 0, \quad$ *about the* $y-$*axis*

#8) $y = x^3, \quad y = 8, \quad x = 0, \quad$ *about* $x = 2$

For #9-14, use the **shell** method to find the volume generated by rotating the region bounded by the given curves about the specified axis. **Sketch and setup the integral, but do not evaluate the integral.**

#9) $y = x^2, \quad y = 0, \quad x = -2, \quad x = -1; \quad$ *about the* $y-$*axis*

#10) $y = x^2, \quad y = 0, \quad x = 1, \quad x = 4; \quad$ *about* $x = 4$

#11) $y = x^3, \quad y = x^2, \quad$ *about* $y = 1$

#12) $x + 3 = 4y - y^2, \quad x = 0, \quad$ *about the* $x-$*axis*

#13) $y = x^3, \quad y = 8, \quad x = 0, \quad$ *about the* $y-$*axis*

#14) $y = \cos x, \quad y = 0, \quad x = \frac{3\pi}{2}, \quad x = \frac{5\pi}{2}; \quad$ *about the* $y-$*axis*