Math 150 Name: _____

QUIZ ON CHAPTER 6

APPLICATIONS OF INTEGRALS; MATH 150 – SPRING 2017 – KUNIYUKI
105 POINTS TOTAL, BUT 100 POINTS = 100%

Show all work, simplify as appropriate, and use "good form and procedure" (as in class).
Box in your final answers!
No notes, books, or phones allowed. A scientific calculator is allowed.

Assume that all graphs here are in the usual *xy*-plane.
Distances and lengths are measured in meters throughout this exam.
Write appropriate units in your final evaluations.
You may not use absolute value (or similar short cuts) in your final integral setups.

1) Find the area of the region *R* bounded by the graphs of $y = 2x^2 + 3x - 4$ and $y = x^2 + 5x + 4$. **Identify any intersection points. You do <u>not</u> have to sketch the region or find intercepts. Evaluate** your integral completely, and give your final answer with appropriate units. Show all work. (18 points)

YOU MAY CONTINUE ON THE BACK OF THE TEST.

2) Using the Disk Method, as we have discussed in class, find the volume of a sphere of radius r. Show all work. (20 points)

3) B is the region in Quadrant I of the xy-plane that is bounded by the x-axis, the y-axis, and the graph of $y = 9 - x^2$. **Sketch and shade in the region *B*.** Find the volume of the solid that has B as its base if every cross-section by a plane perpendicular to the x-axis is a semicircular region with diameter in the xy-plane. **Evaluate** your integral completely, and write your answer as an exact fraction in simplest form, together with appropriate units. Show all work. (18 points)

For the following problems, set up the appropriate integral, but do not evaluate. Your final integrals must have no general notation such as *f*, *g*, *f ′*, or *r* that can be re-expressed more precisely. You do not have to simplify your final answers. Showing some work for the set-up may be worth some partial credit.

4) The region *R* is bounded by the graphs of $x = y^2$ and $x + y = 6$. **Sketch and shade in the region *R*, and identify any intersection points and intercepts. Set up the integral** for the volume of the solid generated if *R* is revolved about the *y*-axis. **Do not evaluate.** Use the Washer Method. (18 points)

5) The region R is bounded by the x-axis and the graphs of $y = x^3$ and $x = 2$. **Sketch and shade in the region *R*, and identify any intersection points and intercepts. Set up the integral** for the volume of the solid generated if R is revolved about the line $y = -2$. **Do not evaluate.** Use the Cylindrical Shell (Cylinder) Method. (15 points)

6) **Set up the integral** for the arc length of the graph of $x = y^2 + y$ from $(2, 1)$ to $(20, 4)$. Your final variable of integration must be x or y, as used in this problem. **Do not evaluate. You do not have to sketch a graph.** (6 points)

7) The graph of $y = \sqrt[3]{x}$ from $(8, 2)$ to $(27, 3)$ is revolved about the x-axis. **Set up the integral** for the area of the resulting surface. Your final variable of integration must be x or y, as used in this problem. **Do not evaluate. You do not have to sketch a graph.** (10 points)