Math 107 Fall '09 **Make-up Exam 1** **Score:** _____

Name: _____ **TA's Name:** _____

Instructions: You must show supporting work to receive full and partial credits. No text book, notes, formula sheets allowed.

1(10pts) Use the definition to determine if the improper integral converge: $\int_e^\infty \frac{2}{x(\ln x)^{3/2}}dx$. (**Show all work.**)

2(15pts) Use trigonometric substitution to evaluate $\int \frac{9}{x^2\sqrt{x^2-9}}dx$.

(*Continue on Next Page ...*)

3(10pts) Let R be the region enclosed by $x = y^2,\ y = 2,\ x = 0$. Sketch the region and use the method of shell to set up an integral whose value gives the volume of the solid obtained by revolving the region R about the vertical line $x = 4$. **Do not evaluate the integral.**

4(10pts) The base of a solid is a quarter disk bounded by $x^2 + y^2 = 4,\ x \geq 0, y \geq 0$. Each cross section of the solid that is perpendicular to the y-axis is a right equilateral triangle as shown. Set up an integral for the volume of the solid. **Do not evaluate the integral.**

(*Continue on Next Page ...*)

5(15pts) Find the partial fraction for the rational function $\dfrac{5x^2 - x + 2}{(x-1)(2x^2+1)}$.

6(15pts) A cylindrical hole of 6 ft in diameter and 10 ft in depth is dug into the ground. Find the work needed to haul the dirt to the ground level, assuming that the average density of dirt is 120 lb/ft^3.

(*Continue on Next Page ...*)

7(10pts) Set up an integral for the length of the ellipse $\frac{x^2}{4} + y^2 = 1$. **Do not evaluate the integral.**

8(15pts) Use the Limit Comparison Test to determine whether the improper integral converge: (**Show all work.**)

$$\int_1^\infty \frac{\sqrt{x}+3}{x^2+\sqrt{x}-1}\,dx$$

.

---

2 Bonus Points: The state flower of Nebraska is (a) dandeline, (b) sunflower, (c) goldenrod, (d) none of the above. (*... The End*)