Mathematics 1132   Print Name: _____

Problem Set

Due Due Thursday, July 7, 2009   Signature: _____

Your signature is your pledge that you have adhered to the guidelines for problem sets and take-home examinations.

This problem set will be graded on the basis of 100 points but will be worth 50 points.

Make sure that you check the course website for instructions, available from the *General Policies* portion of the web site. Remember that your paper may be handed in before the deadline but that no late papers will be accepted regardless of the reason. The course website also includes an explanation of how your average will be calculated if you fail to complete this assignment.

Note that, since most of the calculations involved can be done routinely using either a calculator or a symbolic manipulation program such as Maple or Mathematica, it will obviously be necessary to show, through your work, exactly how you came up with your solutions.

Let $\mathcal{C}_1$ be the portion of the graph of $y = x^2 + 5x - 1$ between the two points where the graphs of $y = 9x - 4$ and $y = x^2 + 5x - 1$ intersect. Let $\mathcal{C}_2$ be the portion of the graph of $y = 9x - 4$ between the two points where the graphs of $y = 9x - 4$ and $y = x^2 + 5x - 1$ intersect. Let $\mathcal{D}$ be the plane region bounded by $\mathcal{C}_1$ and $\mathcal{C}_2$.

For each question, sketch the relevant curve or region, which may be a plane region, solid or surface, and set up a definite integrals whose value will give the quantity indicated and, unless instructed otherwise, evaluate the integral.

1. The area of $\mathcal{D}$.

2. The volume of the solid obtained by rotating $\mathcal{D}$ about the x-axis.

3. The volume of the solid obtained by rotating $\mathcal{D}$ about the line $y = 2$.

4. The volume of the solid obtained by rotating $\mathcal{D}$ about the y-axis.

5. The length of $\mathcal{C}_1$. *Do not evaluate the integral.*

6. The area of the surface obtained by rotating $\mathcal{C}_1$ about the x-axis. *Do not evaluate the integral.*

7. The area of the surface obtained by rotating $\mathcal{C}_1$ about the line $y = 2$. *Do not evaluate the integral.*

8. The area of the surface obtained by rotating $\mathcal{C}_1$ about the y-axis. *Evaluate both integrals.*

Extra Credit

Extra credit will be awarded for the best joke. All jokes must observe standards of good taste. The determination of the best joke will be made by popular vote in class when the papers are returned.

Please write your joke here.