Math 21B

Final Exam

Fall 2010

NAME(print in CAPITAL letters, first name first): _____

NAME(sign): _____

ID#: _____

Instructions: There are fourteen problems. Some questions are easier than others so you are encouraged to read the entire exam before beginning your work. Make sure that you have all 14 problems.

1. (10 points.) Find $\int \frac{e^x}{1+e^x} dx$.

2. (10 points.) Find $\int \frac{\ln x}{x} dx$.

3. (10 points.) Find $\int \frac{x^2}{2x-1} dx$.

4. (10 points.) Find $\int \frac{1}{\sqrt{x+1}} dx$.

5. (10 points.) Find $\int \frac{6x+7}{x^2+4x+4} \, dx$.

6. (10 points.) Find $\int_{-1}^{1} x \sqrt{1-x^2} \, dx$

7. (10 points.) Find $\int \ln x \, dx$.

8. (20 points.) The region under the graph of $y = e^x$, between x = 0 and x = 1, is revolved about the line x = -1. Find the volume of the resulting solid.

9. (20 points.) The region bounded by the graphs of $y = \sqrt{1 - x^2}$ and y = 0 is revolved about the line y = -1. Find the volume of the resulting solid.

10. (20 points.) The region under the graph of $y = e^x$, between x = 0 and x = 1, is revolved about the x-axis. The resulting solid has density $\delta(x) = e^x$. Find the total mass.

11. (20 points.) The triangle below has density 2 N/m^2 . The triangle is lifted and inverted, as shown in the picture below. (All lengths are in meters.) Find the work done.



12. (20 points.) Find the area of the region bounded by the graphs of $y = \sqrt{x}$, y = 0 and y = 2 - x.

13. (20 points.) Find $\int \frac{1}{\sqrt{4+x^2}} dx$.

14. (20 points.) The value of $\sum_{k=1}^{99} \frac{1}{\sqrt{k}}$ is between which two consecutive integers?