

Exam 2b Calc 2 3/4/2011

Each problem is worth 10 points. For full credit provide complete justification for your answers.

1. Evaluate $\int \sin^5 q \, dq$.

2. Evaluate $\int \ln(2x+1) \, dx$.

3. Evaluate $\int \frac{7}{(x+5)(x-2)} dx$.

4. Find the present value of an income stream of \$2000 per year, for a period of 10 years, if the continuous interest rate is 7%.

5. Find the median of the probability density function $p(t) = \begin{cases} 0 & \text{if } t < 0 \\ \frac{1}{3}e^{-t/3} & \text{if } t \geq 0 \end{cases}$.

6. Find the length of the curve $y = \ln(1 - x^2)$ for $0 \leq x \leq \frac{1}{2}$.

7. Bunny is a Calculus student at Enormous State University, and she's having some trouble. Bunny says "Ohmygod, this is sooooo impossible. These integrals are crazy, and even once they said we could use the table it's still so confusing. There was this one on the test, and we were supposed to integrate tangent, right? So I found Line 75 on our table, it's the same book as you guys have, and I used it, and so there was 0 in the bottom of the fraction and I marked "Does Not Exist" for the answer, but they said it was wrong. Is that totally unfair or what?"

Explain clearly to Bunny what limitations the Table of Integrals might have that affected her, and how she might have used it better.

8. Evaluate $\int \tan^n q \sec^2 q dq$.

9. Derive Line 30 on the Table of Integrals.

10. Jon wants to build the world's biggest barrel. It will be shaped like the region obtained by rotating the area below $y = x^2/10$ between $x = -20$ and $x = 20$ around the x -axis. Find the surface area of Jon's barrel.

Extra Credit (5 points possible):
Derive Line 119 on the Table of Integrals.