Questions from Yesterday on the Wall Boards

1. Demonstrate how to get the formula for *integration by parts* starting the formula for the *product rule*.

2. Battle of the Limits I

   (a) Explain why 0^0 could be a *Battle of the Limits*

   (b) Demonstrate how to evaluate $K = \lim_{x \to 0^+} x^x$.

3. Demonstrate how to use integration by parts to evaluate:

   (a) $\int x \sin x \, dx$ (b) $\int t^2 e^t \, dt$ (c) $\int \ln x \, dx$ (d) $\int e^x \sin x \, dx$

   Be sure to check your answers.

More Questions

4. Battle of the Limits II:

   Evaluate $L = \lim_{x \to \infty} \left(1 + \frac{1}{x}\right)^x$.

5. Demonstrate two different techniques for evaluating:

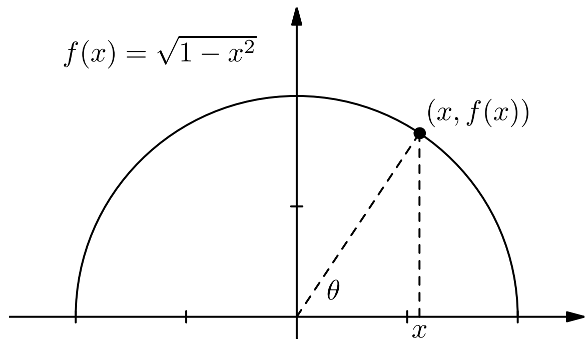
$$\int \sin^2 x \, dx$$

6. Recall we used geometry to evaluate $N = \int_0^1 \sqrt{1-x^2}\,dx$. Now, our goal is to do an evaluation using an antiderivative for $\int \sqrt{1-x^2}\,dx$.

   (a) Look at the triangle in the graph at the right. Write an equation to express x in terms of θ. Explain.

   (b) Consider what happens when you do a θ-substitution by letting $x = \cos\theta$. Push through (e.g. $dx = \ldots$) and get useful expression for $\int \sqrt{1-x^2}\,dx$ in terms of θ.

   (c) Check your answer in part (b) by evaluating $\int_0^1 \sqrt{1-x^2}\,dx$.



7. Evaluate $\int_0^{\pi/2} \cos^5(x)\sin^2(x)\,dx$