$\pi\mu\epsilon$ welcomes you to the

Sixth Annual USC Integration Bee

April 8, 2008

Thanks to our sponsors:

South Carolina Honors College

Department of Mathematics

How it works:

1. Contestants may work with the team of people sitting with them.

How it works:

1. Contestants may work with the team of people sitting with them.

2. An integral will be shown on this screen. While the music plays, contestants will work on the integral. Teams must turn in their solutions in the cookie jar by the end of the song.

How it works:

1. Contestants may work with the team of people sitting with them.

2. An integral will be shown on this screen. While the music plays, contestants will work on the integral. Teams must turn in their solutions in the cookie jar by the end of the song.

3. Put your team name at the top of the page with your solution for each integral.

How it works:

1. Contestants may work with the team of people sitting with them.

2. An integral will be shown on this screen. While the music plays, contestants will work on the integral. Teams must turn in their solutions in the cookie jar by the end of the song.

3. Put your team name at the top of the page with your solution for each integral.

4. Once you have turned in your answer, you may eat, drink, talk, sing but you may not have your answer back!

How it works:

1. Contestants may work with the team of people sitting with them.

2. An integral will be shown on this screen. While the music plays, contestants will work on the integral. Teams must turn in their solutions in the cookie jar by the end of the song.

3. Put your team name at the top of the page with your solution for each integral.

4. Once you have turned in your answer, you may eat, drink, talk, sing but you may not have your answer back!

5. Your team will be awarded points for each correct answer the judges receive. Prizes will be awarded to the teams with the top three scores at the end of the contest.

(1 point)

$$\int \frac{x^2 + 3x - 1}{x + 1}\, dx, \quad \text{where } x < -1.$$

(2 points)

$$\int \frac{\sin\left(\frac{2}{x}\right)}{2x^2}\, dx, \quad \text{where } x > 0.$$

(3 points)

$$\int e^{2x} \cos(3x) \; dx.$$

(1 point)

$$\int \frac{e^{-x}}{e^{-2x}+9}\,dx.$$

(2 points)

$$\int \frac{dx}{x - x \ln x}, \quad \text{where } x > e.$$

(3 points)

a) $\displaystyle\int e^2 \ln 3 \, dx;$

b) $\displaystyle\int \frac{3x + \frac{x^3}{3}}{x^2} \, dx, \qquad \text{where } x < 0;$

c) $\displaystyle\int \left((\cos^2 x + \sec^2 x) - (\tan^2 x - \sin^2 x) \right) \, dx,$

where $x \in \left(-\frac{\pi}{2}, \frac{\pi}{2} \right)$.

HALF TIME

(10 points)

Put the integrals below in order from least to greatest:

(A) $\displaystyle\int_{-1}^{1} (\sin^2 x + 4 \sin x \cos x + \cos^2 x)\, dx;$

(B) $\displaystyle\int_{-1}^{1} (x+1)^3 (x-1)\, dx;$

(C) $\displaystyle\int_{-1}^{1} (-2 + 2|x|)\, dx;$

(D) $\displaystyle\int_{-1}^{1} 5\sqrt[3]{x^2}\, dx;$

(E) $\displaystyle\int_{-1}^{1} \frac{x^{2007} + \sin^{2009} x}{e^{x^{2008}} + 1}\, dx.$

(2 points)

$$\int \frac{dx}{e^{-x} + 2 + e^{x}} \ .$$

(4 points)

$$\int \frac{dx}{\sqrt{-x^2-4x+5}}\,, \qquad \text{where } x \in (-5,1)\,.$$

(6 points)

$$\int \frac{2x^2 - 7x - 2}{2x^2 - 7x + 3}\, dx, \qquad \text{where } x < \tfrac{1}{2}.$$

(2 points)

$$\int \ln^2(x)\, dx, \qquad \text{where } x > 0.$$

(4 points)

$$\int (\sec x - \sin x) e^{\tan x}\, dx, \quad \text{where } x \in \left(-\tfrac{\pi}{2}, \tfrac{\pi}{2}\right).$$

(6 points)

$$\int \frac{2dx}{(x^2+4)^2}$$

THANK YOU