

## Integration Bee Qualifying Test - 2014

You have 1 hour to complete all ten questions. Only answers written on the answer blank will be graded. Each problem is worth 2 points. The top 16 scores will advance to the next level. If there is a tie for the 16th position then the last question will be graded to break the tie. Good Luck!

1.  $I = \int \frac{x+1}{\sqrt{x}} dx$  1. \_\_\_\_\_

2.  $I = \int x \sin(x^2) dx$  2. \_\_\_\_\_

3.  $I = \int e^x \cot(e^x) dx$  3. \_\_\_\_\_

4.  $I = \int x \sin^{-1} x dx$  4. \_\_\_\_\_

5.  $I = \int (\sin 5x \cos 3x + \cos 5x \sin 3x) dx$  5. \_\_\_\_\_

6.  $I = \pi \int_0^{\pi/4} (\cos^2 x - \sin^2 x) dx$  6. \_\_\_\_\_

7.  $I = \int \frac{x}{x^2+1} dx$  7. \_\_\_\_\_

8.  $I = \int \frac{\sin x}{\cos^2 x + 5 \cos x + 6} dx$  8. \_\_\_\_\_

9.  $I = \int \sin^3 x dx$  9. \_\_\_\_\_

10.  $I = \int x^2 \sin 4x dx$  10. \_\_\_\_\_

### **Tie Breaking Question**

This question will only be graded in event of a tie. Evaluate. Exact answers only.

11.  $I = \int_{\pi/6}^{\pi/3} \frac{\cos^3 x}{\sqrt{\sin x}} dx$  11. \_\_\_\_\_

## Qualifying Test - Answers

1.  $I = \frac{2}{3}x^{3/2} + 2x^{1/2} + C$

2.  $I = -\frac{1}{2}\cos(x^2) + C$

3.  $I = \ln|\sin(e^x)| + C$

4.  $I = x \sin^{-1} x + \sqrt{1-x^2} + C$

5.  $I = -\frac{\cos 8x}{8} + C$

6.  $I = \frac{\pi}{2}$

7.  $I = \frac{1}{2}\ln(x^2 + 1) + C$

8.  $I = -(\ln|\cos x + 2| - \ln|\cos x + 3|) + C$

9.  $I = \frac{\cos^3 x}{3} - \cos x + C$

10.  $I = -\frac{1}{4}x^2 \cos 4x + \frac{1}{8}x \sin 4x + \frac{1}{32} \cos 4x + C$

### **Tie Breaking Question**

11.  $I = 2 \left(\frac{\sqrt{3}}{2}\right)^{1/2} - \frac{2}{5} \left(\frac{\sqrt{3}}{2}\right)^{5/2} - \sqrt{2} + \frac{\sqrt{32}}{80}$