

# 21112 (Calculus 2) Lecture 11 - Trigonometric functions - Episode 3: Revenge of the Integrals

Albert Cohen

February 21 2003

A new era has dawned upon us; on the horizon, millions upon millions of integrals, unmatched in their strength and toughness, beckon us, mock us. They are the Trigonometru, an ancient warring integral. Are you ready to do battle ?

(What, you think you could write a better intro?)

Maybe some diagrams in this lecture. Then again, maybe not.

### **Let's Begin!**

So, with our immense broadsword-like knowledge of integral rules (i.e. parts and substitution), we should be a force to reckon with as far as trig integration is concerned. There is no gain without pain, my young charges....

### **Onwards!!!**

Before you can even think of suiting up for battle, try these on for size:

1.  $\int \frac{e^{\tan(x)}}{\cos^2(x)} dx$

2.  $\int e^x \sin(e^x) dx$

3.  $\int e^x \tan(e^x) dx$       Hint: recall the method for  $\int \tan(x) dx$

4.  $\int \frac{\cos(x)}{2\sqrt{\sin(x)}} dx$

If you aren't weakened by these, let's continue your training...

1.  $\int \sin(x)e^{\sin(x)} \cos(x) dx$

2.  $\int \cos^3(x) dx$  Hint:  $\cos^3(x) = \cos(x) \cos^2(x)$

1.  $\int (1 + \cos(x) + \cos^2(x)) \sin(x) dx$

2.  $\int \sin(2x) dx$

What!?! You want more ? Brace yourselves!

1.  $\int x \sin(x) dx$

2.  $\int x \sin(x^2)$

3.  $\int x^2 \sin(x)$

## Homework

Try the following:

1.  $\int x^n \sin(x^{n+1}) dx$       for any  $n \neq -1$
2.  $\int \ln(\sin^{\cos(x)}(x)) dx$       Remember that  $\ln(z^a) = a \ln(z)$
3.  $\int \cos^2(x) \tan(x) dx$       Remember that  $\tan(x) = \frac{\sin(x)}{\cos(x)}$