Math 199 CD3 Merit Worksheet for Midterm 1

February 4, 2022

1 Calculation with FTOC (What is this?)

Calculate the following integral:

1. $$\int_a^b \frac{d}{dx}\left(\frac{180+\sin(3\pi x^2)}{90+\cos(3\pi x^2)}\right)dx$$

2 FTOC

For the following problem, Find the value of x so that the function obtain absolute maximum/minimum value.

1. $$g(x)=\int_3^{9x^2+5x-19}\frac{1}{3t^3+6t^2+8t+1}dt$$

2. $$g(x)=\int_5^{7x^2+15x-25}e^{3t^3+9t^2+8t+1}dt$$

3.

$$g(x) = \int_{7}^{12x^2+5x-23} e^{3t^3+6t^2+25} dt$$

3 Integration by Part

1.

$$\int xe^{3x} dx$$

2.

$$\int x^2 \ln(x) dx$$

3.

$$\int \ln(x)/x^2 dx$$

4.

$$\int \ln(x^2+1) dx$$

4 Trig Integral and Trig Sub

1.

$$\int \sec^n x$$

2.

$$\int \tan^4 x \sec x$$

3. $$\int \tan^3 x \sec^3 x$$

4. $$\int 7 \sin^2 x dx$$

5. $$\int \frac{dx}{x^2\sqrt{x^2-9}} dx$$

6. $$\int \frac{dx}{(4-x^2)^{3/2}} dx$$

7. Sometimes you might see an integral quite similar to the one above but you don't really need trig sub. When is that?

Also, study some integration technique you have seen today in class. They might be helpful for integral manipulation if you stuck. Be able to quick moving around mathematical expression is one of the most important skill in calculus