Name:

MAC 2311 - Analytical Geometry and Calculus I

Quiz # 11, November 16, 2023

This quiz is graded on completion and 10/10 is awarded for attempting problems and attending today's discussion class. No make-ups are allowed for quiz 11. You are not expected to solve all these problems within the discussion class. The intention is to provide additional practice material.

Problem 1 .

Find the anti-derivatives of the following functions. Use C to denote the constant.

1. $$(x^2-1)^2$$

2. $$\sqrt{\frac{3}{z}}$$

3. $$\frac{4+u^2}{u}$$

4. $$cos(\theta)$$

5. $$-2cos(\theta)sin(\theta)$$

6. $$cos(\theta)sin(\theta)$$

7. $$\frac{4}{\sqrt{1-x^2}}$$

8. $$e^{2u+1}$$

9. $$|x|$$

Anti derivatives are unique up to a constant.

- But

- $\cos^2\theta$
- $-\sin^2\theta$
- $\frac{1}{2}(\cos(2\theta))$

$-\sin(2\theta)$

$= -2\sin\theta \cdot \cos\theta$.

why?

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1. $(x^2-1)^2$

$= x^4 - 2x^2 + 1$

Anti-Derivative is

$\frac{x^5}{5} - \frac{2x^3}{3} + x + C$

2. $\sqrt{\frac{3}{z}} = \sqrt{3} \cdot z^{-\frac{1}{2}}$

Anti-derivative is

$\frac{\sqrt{3}\, z^{\frac{1}{2}}}{\frac{1}{2}} = 2\sqrt{3}\,\sqrt{z} + C$

3. $\frac{4+u^2}{u} = \frac{4}{u} + \frac{u^2}{u} = \frac{4}{u} + u$

Anti-derivative is

$4\ln|u| + \frac{u^2}{2} + C$

absolute values inside.

4. $\cos(\theta)$

The anti-der. is $\sin(\theta) + C$

5. $-2\cos(\theta)\sin\theta$

Anti derivative is

$\cos^2\theta + C_1$, $-\sin^2\theta + C_2$ $-\sin(2\theta) + C_3$ (All equal up to a constant using trig. identities)

6. $\cos\theta \cdot \sin\theta$

The anti-derivative is

$-\frac{1}{2}\cos^2\theta + C$

7.) $\frac{4}{\sqrt{1-x^2}}$

Anti derivative is

$4\arcsin(x) + C$

8.) e^{2u+1}

Anti-derivative is

$\frac{1}{2}e^{2u+1} + C$

9.) $|x|$

$= \begin{cases} x, & x \geq 0 \\ -x, & x < 0 \end{cases}$

Anti derivative

$= \begin{cases} \frac{x^2}{2} + C, & x \geq 0 \\ -\frac{x^2}{2} + C, & x < 0 \end{cases}$