King Fahd University of Petroleum and Minerals
Department of Mathematics

Math - 106 Semester - 251 Quiz # IV

Name: **S. No.:** **ID:**

Maximum Marks: 05 Section: Time Allowed: 15 Minutes

Instructions: *There are Five multiple choice questions. Each question carry equal mark. Put the right sign ($\surd$) against the correct answer. Give the answer of all questions.*

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1. To evaluate the integral $\int \sqrt[3]{x}e^{\sqrt[3]{8x^4}}dx$, we need to substitute

   ✓ (a) $u = \sqrt[3]{8x^4}$
   (b) $u = 8x^4$
   (c) $u = x^4$
   (d) $u = \sqrt[3]{x^2}$
   (e) None of the above

   Substitute $u = \sqrt[3]{8x^4} = 2x^{4/3} \Rightarrow du = 2\times\frac{4}{3}x^{1/3}dx$

   i.e., $\frac{3}{8}du = \sqrt[3]{x}\,dx$. So, $\int \sqrt[3]{x}\, e^{\sqrt[3]{8e^4}}dx = \frac{3}{8}\int e^u du$

2. Assume that $f' > 0$, then $\int e^{f(x)+\ln(f'(x))}dx =$ $\int e^{f(x)} \cdot e^{\ln(f'(x))}dx = \int e^{f(x)} f'(x)\,dx = I$

   ✓ (a) $e^{f(x)} + C$
   (b) $e^{f'(x)} + C$
   (c) $e^{f(x)+\ln(f'(x))} + C$
   (d) $f'(x)$
   (e) None of the above

   Substitute $u = f(x) \Rightarrow du = f'(x)dx$

   $I = \int e^u du = e^u + C = e^{f(x)} + C$

3. If $\int_1^2 f(x)dx = 5$ and $\int_3^1 f(x)dx = 2$, then $\int_2^3 f(x)dx$ is

   $\int_1^3 f(x)dx = \int_1^2 f(x)dx + \int_2^3 f(x)dx$

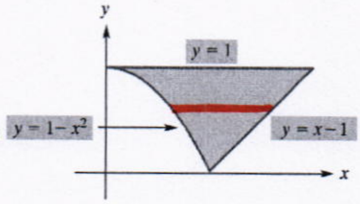
   ✓ (a) -7
   (b) -5
   (c) 5
   (d) 7
   (e) None of the above

   $\Rightarrow \int_2^3 f(x) = \int_1^3 f(x)dx - \int_1^2 f(x)dx$

   $= -\int_3^1 f(x)dx - \int_1^2 f(x)dx = -2-5=-7$

4. The area of the shaded region in the following figure is expressed as

$x = \sqrt{1-y} \Leftarrow$



$\Rightarrow x = y+1$

(a) Area = $\int_0^1 \left[(1+y) - \sqrt{1-y}\right] dy$

(b) Area = $\int_0^1 \left[(x-1) - (1-x)^2\right] dx$

(c) Area = $\int_0^1 \left[(1-x)^2 - (x-1)\right] dy$

(d) Area = $\int_0^1 \left[\sqrt{1-y} - (1+y)\right] dy$

(e) None of the above

$$\text{Area} = \int_0^1 [x_{right} - x_{left}]\, dy$$

$$= \int_0^1 [(1+y) - \sqrt{1-y}]\, dy$$

5. $\frac{d}{dt}\left[\ln(\sec t + \tan t)\right] = \frac{1}{\sec t + \tan t} \frac{d}{dt}(\sec t + \tan t) = \frac{1}{\sec t + \tan t}[\sec t \tan t + \sec^2 t]$

$$= \frac{\sec t\,[\tan t + \sec t]}{\sec t + \tan t} = \sec t$$

(a) $\sec^2 t$

(b) $\tan^2 t$

(c) $\sec t + \tan t$

(d) $\sec^2 t + \tan^2 t$

(d) None of the above

For Rough Work