Recitation Exam 1

Student

Ivan Wang

Total Points

2 / 5 pts

Question 1

(I1) - Question 1   0 / 1 pt

✔ **− 1 pt** (P) Progressing

③ intergal of U^{-1} should be $ln|u|$

Question 2

(I2) - Question 2   0 / 1 pt

✔ **− 1 pt** (P) Progressing

④ try to avoid dividing by a variable

⑤ incorrect substitution step

Question 3

(I3) - Question 3   0 / 1 pt

✔ **− 1 pt** (P) Progressing

① Incorrect

② Incorrect

Question 4

(I4) - Question 4   1 / 1 pt

✔ **− 0 pts** (M) Mastery

Question 5

(I5) - Question 5   1 / 1 pt

✔ **− 0 pts** (M) Mastery

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MTH 142 —— Recitation Exam #1

Directions

1. **You're going to do great!**

2. You do not need to simplify your answer, unless otherwise indicated.

3. Show all necessary work, unless otherwise indicated.

4. Use correct notation.

Academic Integrity

Take this exam with integrity. **Don't cheat.**

1. No calculators or electronic devices are allowed.

2. No other resources are allowed during the exam (this means notes, formula sheets, people, websites, etc.)

Any academic integrity violation will result in **at least** a 0 on this exam.

Grading

Each question will be graded on the M/P/U scale described in the course syllabus.

Mastery (M): All necessary work is shown, your answer is correct, and correct mathematical notation is used. (Small non-calculus mistakes that do not significantly detract from the solution may be okay.)

Progressing (P): Any question earning this score **can be attempted again** during the follow-up exam. This gives you another opportunity to demonstrate Mastery. Future attempts will not necessarily be the exact same question, but will assess the same learning outcome.

Unsatisfactory (U): Any question earning this score **cannot be attempted again.**

Q1: (I1) Calculate the indefinite integral: $\int \dfrac{4e^x}{5+2e^x}\,dx$

$$\int 4e^x \cdot (5+2e^x)^{-1}\,dx$$

$$\int (u)^{-1}\,2\,du$$

$$2\int \frac{1}{-1+1}\,u^{-1+1}\,du$$

$$2\int 1 + C$$

$$= 2 + C$$

$u = 5 + 2e^x$
$du = 2e^x\,dx$
$2\,du = 4e^x\,dx$

Q2: (I2) Calculate the definite integral: $\int_0^1 16x^3 \sin(8 - x^4)\,dx$

$$\int_0^1 u \cdot -4\left(\frac{du}{\cos(8-x^4)}\right)$$

$u(1) = \sin(7)$
$u(0) = \sin(-8)$

$u = \sin(7)$

$$\frac{\cdot 4}{\cos(8-x^4)}\int \frac{1}{2}u^2 + du \ \Big]_{\sin(-8)}^{\sin(7)}$$

$u = \sin(-8)$

$$= -\frac{4}{\cos(6-x^4)}\left(\frac{1}{2}\sin^2(7)\right) - \left(\frac{1}{2}\sin^2(-8)\right)$$

$u = \sin(8 - x^4)$
$$du = \cos(8-x^4) = 4x^3\,dx$$
over $\cos(8-x^4)$
$\cos(8-x^4)$

$$\frac{du}{\cos(8-x^4)} = -4x^3\,dx$$

$$-4\left(\frac{du}{\cos(8-x^4)}\right) = \left(4x^3\,dx\right)-4$$

$$-4\left(\frac{du}{\cos(8-x^4)}\right) = 16x^3\,dx$$

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Q3: (I3) Calculate the indefinite integral: $\int (8x-4)\ln(3x)\,dx$

You must explicitly state u, du, v, dv as part of your work.

$$\underset{\text{L I A T E}}{\overset{u \quad\quad\quad\quad\quad dv}{\longleftarrow\quad\longrightarrow}}$$

$$\cancel{\ln(3x)\cdot \tfrac{8}{2}x^2 - \int \frac{6x^2}{2x}\,dx}$$

$$= \ln(3x)\cdot \tfrac{8}{4}x^2 - \int 4x\,dx$$

$$4\cdot\tfrac{1}{2}x^2 = 2x^2$$

$$= \ln(3x)\cdot 4x^2 - 2x^2 + C$$

$u = \ln(3x) \qquad dv = 8x-4\,dx$

$du = \dfrac{1}{3x}\cdot 3 = \dfrac{2}{3x} \qquad v = \dfrac{8}{2}x^2$

$\quad\quad = \dfrac{1}{x}\,dx$

Q4: (I4) Calculate the definite integral: $\int_{-1}^{3}(3x+1)e^{3x}\,dx$

You must explicitly state u, du, v, dv as part of your work.

$$\underset{\text{L I A T E}}{\overset{u \quad\quad\quad\quad\quad dv}{\longleftarrow\quad\longrightarrow}}$$

$$\tfrac{1}{3}(3x+1)e^{3x} - \int e^{3x}\,dx$$

$u = 3x+1 \qquad dv = e^{3x}\,dx$

$du = 3\,dx \qquad v = \tfrac{1}{3}e^{3x}$

$$= \left. \tfrac{1}{3}(3x+1)e^{3x} - \tfrac{1}{3}e^{3x}\,dx \right]_{-1}^{3}$$

$$= \left(\tfrac{1}{3}(9+1)e^{9} - \tfrac{1}{3}e^{9}\right) - \left(\tfrac{1}{3}(-3+1)e^{-3} - \tfrac{1}{3}e^{-3}\right)$$

Q5: (I5) Calculate $\int \sin^5 x \cos^4 x \, dx$

You must clearly indicate if you use any trig identities in your work.

$odd = \sin x$
$opposite = \cos x$

$\boxed{\sin^2\theta + \cos^2\theta = 1}$

$(\sin^2\theta) = (1 - \cos^2\theta)^2$

$= \boxed{-\frac{1}{5}(\cos(x))^5 + \frac{2}{7}(\cos x)^7 - \frac{1}{9}(\cos x)^9}$
$+ C$

$\int \sin^4 x \cos^4 x \, \sin x \, dx$

$\int (1 - \cos^2 x)^2 \cdot \cos^4 x \cdot (-du)$

$u = \cos(x)$

$du = -\sin(x)\,dx$

$\int (1 - \cos^2 x)^2 \cdot u^4 \cdot (-du)$

$\int (1 - u^2)^2 \cdot u^4 \cdot (-du)$

$(1 - u^2)(1 - u^2) = 1 - 2u^2 + u^4$

$\int -\frac{1}{5}u^5 + \frac{2}{7}u^7 - \frac{1}{9}u^9 + C$

$u^4(1 - 2u^2 + u^4) = -u^4 + 2u^6 - u^8$

Extra Space - Clearly indicate in the original answer space if there is any work you want graded here.

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