Elda Sarahi Del Rio Santillan **Final ePortfolio**
A01570233 **Calculus II**

5. Quiz 1 Second Partial (with corrections)

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Prepa Tec
Campus Cumbres

Calculus II
2nd partial Quiz #1A

Name Elda Sarahi Del Rio Santillan I.D. A01570233 Date: 23 Feb 2018

I. Determine if the following propositions are True (T) or False(F) (5 points each):

1. (T) Having $\int(\sin x + \cos x)dx$ is the same as having $\int(\sin x)dx + \int(\cos x)dx$

2. (T) The answer for $\int 6\frac{\csc(3x)}{\sin(3x)}dx$ is $-2\cot(3x)+C$

3. (T) $\int x(x^2+3)^2\,dx = \frac{1}{6}(x^2+3)^3 + C$

4. (F) $\int(x^2-3)\tan(x^2-3x)dx = -\ln\left|\cos(x^2-3x)\right| + C$

5. (F) The integral of $\int(2\sin 3x + 3x)dx$ is $-6\sin 3x + 3 + C$

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$u=3x$ $du=3$

$\frac{6}{2}\csc^2(3x) = -2\cot(3x)+C$

$\frac{1}{2}\frac{(x^2+3)^3}{3}+C$ $u=x^2+3$ $du=2x$

$\frac{1}{6}(x^2+3)^3+C$

$u=3x$ $du=3$

$\int 2\sin 3x + 3x$
$-\frac{2}{3}\cos 3x + \frac{3x^2}{2} + 6$

$u=x^2-3x$ $du=2x-3$

II. Solve the following exercises, show ALL your procedure and frame your final answer. (15 points each).

If the equation of acceleration of an object is $a(t) = \frac{3}{t-4}$ and the velocity at t =5 is 8 m/s, then find the equation that determines the velocity of the object at any time '*t*'.

$v(5) = 8$ m/s

$v(t) = 3\ln|t-4| + c$

$8 = 3\ln|5-4| + c$

$8 = 0 + c$

$8 = c$

$\boxed{v(t) = 3\ln|t-4| + 8}$

$a(t) = \frac{3}{(t-4)}$ $3/3 = 1$

$3(t-4)^{-1+1} = 0$

$u = t-4$

$du = 1$

15

III. Find the antiderivative or integral of the following problems. SHOW YOUR ENTIRE PROCEDURE. (15 pts each)

1- $h(x) = 96\,Sin^2(2x+\pi)\,Cos(2x+\pi)$

$\frac{1}{2}\cos 2u + 1$

$(1 + \frac{1}{2}\cos 2u)\,du$

$96(1 + \frac{1}{2}\cos 2(2x+\pi))$

$48(1 + \cos 2(2x+\pi)).\cos(2x+\pi)$

$\frac{\cos(4x+\pi)}{4}$

$48(x + \frac{1}{4}\sin(4x+\pi)\cdot\sin(2x+\pi) + c$

$\boxed{H(x) = 48(x + \frac{1}{4}\sin(4x+2\pi).\cdot\sin(2x+\pi) + c}$

$\underbrace{(\sin(2x+\pi))}_{u}{}^2$

$du = 2\cos(2x+\pi)$

6

2- $v(t)=\dfrac{e^{5/t}}{3t^2}$

$v(t) = e^{5/t} \cdot \frac{5}{3} 3t^{-2}$

$\boxed{x(t) = \frac{3}{5} e^{5/t} + C}$

$u = 5/t$

$du = \frac{-5}{t^2} \to -5t^{-2}$

$u = 5 \quad u' = 0$
$v = t \quad v' = 1$

$\frac{-5}{t^2}$

10

3- $\int 3x\,Cot(6x^2-1)Sin(6x^2-1)dx$

$3x \cot(6x^2-1)\,dx \cdot \sin(6x^2-1)\,dx$

$u = 6x^2 - 1$
$du = 12x$

$\boxed{\frac{1}{4} \cancel{\ln} |\sin(6x^2-1)| + C}$

$\int \frac{\cos}{\sin} \cancel{\sin} = \int \cos\,dx$

0

4- $\int 7\sec(3x)\tan(3x)dx$

$u = 3x$
$du = 3$

$\boxed{\frac{7}{3}\sec(3x) + C}$

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Corrections Quiz 1 Second Partial

2nd Partial Quiz #1A

III. Find the antiderivative or integral of the following problems. Show your entire procedure

(i) $h(x) = 96\sin^2(2x+\pi)\cos(2x+\pi)$

$\left(\frac{1}{48}\right) \cdot 96(\sin(2x+\pi))^2 \cos(2x+\pi)$

$u = \cos(2x+\pi)$ $\quad H'(x) = \frac{48(\sin(2x\ \pi))^3}{3} + C$

$du = \sin(2x \cdot \pi)$

$= \boxed{H'(x) = 16(\sin(2x+\pi))^3 + C}$

(2) $v(t) = \frac{e^{5/t}}{3t^2}$ $\quad v(t) = e^{5/t} \cdot \frac{5}{3} \cdot 3t^{-2}$

$u = 5/t$ $\quad \boxed{x(t) = 5e^{5/t} + C}$

$du = -5/t^2 \rightarrow -5t^{-2}$

$u = 5 \quad u' = 0$
$v = t \quad v' = 1$

(3) $\int 3x\cot(6x^2-1)\sin(6x^2-1)\,dx$

$3x \frac{\cos(6x^2-1)}{\cancel{\sin(6x^2-1)}} \cancel{\sin(6x^2-1)}\,dx \rightarrow \int 3x\cos(6x^2-1)\,dx$

$u = 6x^2-1$

$du = 12x$

$\boxed{\frac{1}{4}\sin(6x^2-1) + C}$

6. Quiz 2 Second Partial (with corrections)

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2^{st} partial Quiz # 2A

Name Fida Sarahi Del Rio Santillan I.D. A01570233 March, 2nd 2018

I . Solve the following integrals. SHOW THE STEPS OF YOUR PROCEDURE. (20 points each)

1. $\int Sin^3(2x)dx$

$\sin^2 + \cos^2 = 1$

$\sin^2 = 1 - \cos^2$

$\int \sin^2(2x) \cdot \sin(2x)\, dx$

$\int (1-\cos^2(2x))\sin(2x)$

$u = \cos(2x)$

$\int \sin(2x) - \cos^2(2x)\sin(2x)$

$du = -2\sin(2x)$

$\int \sin(2x) - \int \cos^2(2x)\sin(2x)$

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$-\cos(2x) + \frac{1}{2}\frac{(\cos^3(2x))}{(3)} + c \rightarrow \boxed{-\frac{\cos(2x)}{2} + \frac{\cos^3(2x)}{6} + c}$

2. $\int x^6\cos^2(x^7)dx$

$\int x^6\left[\frac{1}{2}(1+\cos 2(x^7))\right] dx$

$\frac{1}{2}\int x^6[(1+\cos 2(x^7))]$

$u = 2x^7$

$du = 14 \cdot x^6$

$\frac{1}{2}\int x^6 + x^6\cos 2x^7$

$\frac{1}{2}\left(\frac{x^7}{7} + \frac{1\sin(2x^7)}{14} + c\right) \rightarrow \frac{1}{2}\left(\frac{x^7}{7} + \frac{\sin(2x^7)}{14}\right) + c$

20

simplificado : $\frac{x^7}{14} + \frac{\sin(2x^7)}{28} + c$ ✓

3. $\int 9x^4\tan^3(x^5)dx$

$1 + \tan^2\theta = \sec^2\theta$

$9\int x^4\tan^3(x^5)\,dx$

$\tan^2\theta = \sec^2\theta - 1$

$9\int x^4\tan^2(x^5)\tan(x^5)\,dx$

$9\int x^4(\sec^2(x^5) - 1)\tan(x^5) = \frac{1}{5}\tan(x^5) - \frac{x^5}{5} + c$

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$9\int x^4\sec^2(x^5) - x^4$

$u = x^5 \quad du = 5x^4$

$\frac{9}{5}\int x^4\sec^2(x^5)dx - \int x^4 dx$

$\boxed{= 9\left(\frac{1}{5}\tan(x^5) - \frac{x^5}{5}\right) + c}$

4. $\int x^3 sin^2(x^4)dx$

$\frac{1}{2}\left(\frac{x^4}{4} - \frac{1}{8}\sin 2x^4\right) + c$

$\int x^3 \left[\frac{1}{2}(1-\cos 2\theta)\right]$

$\boxed{\frac{x^4}{8} - \frac{\sin 2x^4}{16} + c}$

$\frac{1}{2}\int x^3 (1-\cos 2(x^4))$

$\frac{1}{2}\int x^3 - x^3 \cos 2x^4$

20

$\frac{1}{2}\left(\int x^3\,dx - \int x^3 \cos 2x^4\right.$ $\quad u = 2x^4$

$du = 8x^3$

5. $\int Cot^2(5x)dx =$

$1 + \cot^2\theta = \csc^2\theta$

$u = 5x$

$du = 5$

$\int (\csc^2(5x) - 1)$

$\cot^2\theta = \csc^2\theta - 1$

$\boxed{= -\frac{1}{5}\cot(5x) - x + c}$

20

BONUS (8 POINTS)

$\sin^2 + \cos^2 = 1$

$\int Cos^5(3x)dx$

$\cos^2 = 1 - \sin^2$

$\int \cos^2(3x)\cos^2(3x)\cos(3x)\,dx$

$\int (1-\sin^2(3x))(1-\sin^2(3x))\cos(3x)$

$u = \sin(3x)\quad du = -3\cos(3x)$

$u = \sin(3x)\quad \frac{du}{3} = \cos(3x)$

$\int \cos(3x) - \sin^2(3x)\cos(3x) + (\cos(3x) - \sin^2(3x)\cos(3x))$

$\frac{1}{3}\sin(3x) + \frac{1}{3}\frac{\sin^3(3x)}{3} + \frac{1}{3}\sin(3x) + \frac{1}{3}\frac{\sin^3(3x)}{3} + c$

$\frac{1}{3}\sin^3(3x) + \cancel{\sin(3x)} + \frac{1}{3}\sin^3(3x) + c$

Corrections Quiz 2 Second Partial

2nd partial QUIZ #2A

1. $\int \sin^3(2x)\,dx$

$\int \sin^2(2x)\cdot\sin(2x)\,dx$

$\int (1-\cos^2(2x))\sin(2x)$ $\quad u=\cos(2x) \quad du=-2\sin(2x)$

$\int \sin(2x) - \cos^2(2x)\sin(2x)$

$\int \sin(2x) - \int \cos^2(2x)\sin(2x)$

$\frac{-1\cos(2x)}{2} + \frac{1}{2}\frac{\cos^3(2x)}{(3)} + C = \boxed{\frac{-\cos(2x)}{2}+\frac{\cos^3(2x)}{6}+C}$

3. $\int 9x^4\tan^3(x^5)\,dx$

$9\int x^4\tan^3(x^5)\,dx$

$\int x^4\tan^2(x^5)\tan(x^5)\,dx$

$\int (\sec^2(x^5)-1)\tan(x^5)$

$9\int x^4\tan(x^5)\sec^2(x^5) \quad x^4\tan(x^5)\,dx$

$5x^4$

$5x^4\sec^2(x^5)$

$= \frac{1}{5}\frac{\sec^3(x^5)}{3} - \left[-\frac{1}{5}\ln|\cos(x^5)|\right] + C$

$= \frac{1}{15}\sec^3(x^5) + \frac{1}{5}\ln|\cos(x^5)| \to \boxed{\frac{3}{5}\sec^3(x^5)+\frac{9}{5}\ln|\cos(x^5)|+C}$

BONUS

$\int \cos^5(3x)\,dx$

$\int \cos^2(3x)\cos^2(3x)\cos(3x)$ $\quad u=\sin(3x) \quad du=-\frac{1}{3}\cos(3x)$

$\int (1-\sin^2(3x))(1-\sin^2(3x))\cos(3x)$

$\int \cos(3x)-\sin^2(3x)\cos(3x)+(\cos(3x)-\sin^2(3x)\cos(3x))$

$\frac{1}{3}\sin(3x)+\frac{1}{3}\frac{\sin^3(3x)}{3}+\frac{1}{3}\sin(3x)+\frac{1}{3}\frac{\sin^3(3x)}{3}+C$

$=\boxed{\frac{1}{3}\sin(3x)+\frac{1}{9}\sin^3(3x)+\frac{1}{9}\sin^3(3x)+C}$

7. Quiz 1 Third Partial (with corrections)

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Calculus II

3rd partial **Quiz # 1B**

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Choose T (true) or F (false) for each statement.

1. The integral of $\int (8x+4)(x^2+x)^3\,dx$ is $\frac{1}{4}(x^2+x)^4 + C$ false — F T

$u = x^2 + x$

$du = 2x + 1$

2. The integral of $\int 4x\sqrt{2x-3}\,dx$ is $(2x-3)^{\frac{5}{2}} + (2x-3)^{\frac{3}{2}} + C$ → $\frac{2}{5}(2x-3)^{5/2} + \frac{2(2x-3)^{3/2}}{3} + C$ — F T

$4x\ (2x-3)$ $u = 2x-3$ $x = \frac{u+3}{2}$ $du = 2dx$ $dx = \frac{du}{2}$

3. The partial fraction decomposition of the integral $\int \frac{x^2+4}{3x^3+4x^2-4x}dx$ is $\frac{A}{x} + \frac{B}{(3x-2)} + \frac{C}{(x+2)}$ — F T

5A

$x\,(3x-2)(x+2)$

$3x^2 - 2x\,(x+2)$ → $3x^3 + 6x^2 - 2x^2 - 4x$ → $3x^3 + 4x^2 - 4x$

4. The integral of $\int \frac{x^2+26x+12}{5x^3+3x^2}dx$ is $-\frac{9}{5}\ln|5x+3| + 2\ln|x| - \frac{4}{x} + C$ — F T

$x\,(5x+3)$ $\neq$

$5x^2 + 3x$

$x\,(5x^2 + 3x)$ $5x^3 + 3x^2$ ∘ $x^2(5x+3)$ $5x^3 + 3x^2$

5. Solve the following integral, **SHOW THE STEPS OF YOUR PROCEDURE.**

$\int \frac{2x^3 - 4x^2 - 15x + 5}{x^2 - 2x - 8}dx$

$\cancel{\int \frac{3x^3 - 23x^2 - 2x + 112}{x^2 - 5x - 14}dx}$

num > denominador
∴ DIV SINTÉTICA

$x - 4$

$x^2 - 2x - 8 \ \overline{)\ 2x^3 - 4x^2 - 15x + 5}$

$-x^3 + 2x^2 + 8x$

$1x^3 - 2x^2 - 7x + 5$

$-0x^3 + 4x^2 - 8x - 32$

$x^3 + 2x^2 - 13x - 27$

$\int (x-4) + \frac{x^3 + 2x^2 - 13x - 27}{x^2 - 2x - 8}$

$\frac{(x-4)^{2+1}}{2}$

$x \mid -4 = -4x$

$x \mid 2 = 2x$

$-2x$ → $(x-4)(x+2)$

1/2

$\frac{A}{(x-4)} + \frac{B}{(x+2)}$ → $A(x+2) + B(x-4) = x^3 + 2x^2 - 13x - 27$

$x = -2$ $x = 4$

$A(4+2) + B(4-4) = 4^3 + 2(4)^2 - 13($

$A(6) + B(0) = 64 + 32 - 52 - 27$

$A(6) = 17$ $A = 17/6$

$A(-2+2) + B(-2-4) = (-2)^3 + 2(-2)^2 - 13(-2) - 27$

$A(0) + B(-6) = -8 + 8 + 26 - 27$

$B(-6) = -1$

$B = -1/-6$ → $B = 1/6$

$\frac{17/6}{(x-4)} + \frac{1/6}{(x+2)}$ → $\boxed{\frac{(x-4)^2}{2} + \frac{17}{6}\ln|x-4| + \frac{1}{6}\ln|x}$

$du = 1$ $du = 1$

2.

$$\int 4x\sqrt{2x-3}\,dx$$

$U = 2x-3$ $\quad x = \dfrac{u+3}{2}$

$du = 2\,dx$ $\quad dx = \dfrac{du}{2}$

$$4\int \left(\frac{u+3}{2}\right) u^{1/2}\,\frac{du}{2}$$

$$\frac{4}{2}\int (u+3)\,u^{1/2}\,\frac{du}{2}$$

$$\frac{2}{2}\int (u+3)\,u^{1/2}\,du$$

$$1\int u^{3/2} + 3u^{1/2}\,du$$

$$\frac{u^{5/2}}{5/2} + \frac{u^{3/2}}{3/2}$$

$$\downarrow$$

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

4.

$$\int \frac{x^2+26x+12}{5x^3+3x^2}\,dx$$

$x\,(5x^2+3x)$

Corrections Quiz 1 Third Partial

3rd Partial Quiz #1B

4. The integral of $\int \frac{x^2+26x+12}{5x^3+3x^2}\,dx$ is $-\frac{9}{5}\ln|5x+3| + 2\ln|x| - \frac{4}{x} + C$

True

5. $\int \frac{2x^3-4x^2-15x+5}{x^2-2x-8}\,dx$

$$\begin{array}{r} 2x \\ x^2-2x-8 \,\overline{)\, 2x^3-4x^2-15x+5} \\ \cancel{+2x^3} \; \cancel{+4x^2}+16x \\ \hline x+5 \end{array}$$

$\int 2x + \frac{x+5}{x^2-2x-8}$ $\quad \frac{A}{x+2} + \frac{B}{x-4}$

x 2
x -4

$x+5 = Ax - 4A + Bx + 2B$

$5 = -4A + 2B$

$5 = -4(1-B) + 2B$

$5+4 = 4B + 2B$

$9 = 6B$

$3/2 = B$

$1 = A + B$

$1 - 3/2 = A$

$-1/2 = A$

$\int \frac{-1/2}{x+2} + \frac{3/2}{x-4}$

$$\boxed{x^2 - \frac{1}{2}\ln|x+2| + \frac{3}{2}\ln|x-4| + C}$$