SIGNIFICANT ACTIVITIES

01 FIRST PARTIAL

Activity 1.04: Differentials was great to expand my knowledge in differentials, for it had more problems, and in this case in word problems. Therefore I could understood their applications, which also helped me to remember some geometric formulas.

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100

Activity 1.04: Differentials - Applications

By: Arq. Monica M. Paniagua & Lic. Lucy Solis

Name Barbara Anear ID A01570137 Date 12/01/18

Use differentials and increments to solve the following

1. The cost of painting a spherical shaped storage tank is of $15.00 per square meter. Determine the change in cost for painting the tank if the radius of the tank is reduced from 3m to 2.25m. (*Hint:* Surface of a sphere $S = 4\pi \cdot r^2$)

decrement

$\Delta C = C_2 - C_1$

reduced original function

$S = 4\pi r^2$

$S_1 = 4\pi(3)^2$

$S_1 = 113.1$

$S_2 = 4\pi(2.25)^2$

$S_2 = 63.62$

$S = 63.62 - 113.1$

$S = -49.48\,(15) = \boxed{\$-742.24}$

2. The temperature of a coffee at room temperature, t minutes after it has been served, is given by $T = 82 - 4\sqrt{t}$, where T is being measured in °C

a) Find the change in the temperature of the coffee when time goes from 7 min to 8 min

b) Find the approximate change for the temperature of the coffee for the same times given in a)

$t_1 = 82 - 4\sqrt{7}$

$t_1 = 71.42$

$t_2 = 82 - 4\sqrt{8}$

$t_2 = 70.69$

$\Delta t = t_2 - t_1$

a) $\boxed{\Delta t = -0.733}$°C

$T = 82 - 4\sqrt{t}$

$T' = -4(t)^{1/2}$

$T' = -2(t)^{-1/2}$

$T' = \frac{-2}{\sqrt{t}}\, dt$

$T = \frac{-2}{\sqrt{7}}\,(1)$ $\boxed{dT = -0.76}$°C

3. A can is going to be modified in such a way that its height will change from 12cms to 12.5 cms but the diameter of the base will remain as 8cms

a) Find the change in the volume of the can

b) Find the approximate change in the volume of the can

$V = \pi r^2 h$

$V_1 = \pi(4)^2(12) = 192\pi$

$V_2 = \pi(4)^2(12.5) = 200\pi$

$\Delta V = V_2 - V_1$

a) $\boxed{\Delta V = 25.13\,cm^3}$

$dV = \pi 2 r dV$

$dV = \pi 2(4)(0.5)$

$\boxed{dV = 25.13\,cm^3}$

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$dx = 0.1$

4. The edge of a cube was found to be 30 cm. with a possible error in measurement of 0.1cm. Estimate the maximum possible error in computing (a) the volume of the cube and (b) the surface area.

a) $V = x^3$

$V = 3x^2\,(dV)$

$V = 3(30)^2(0.1)$

$\boxed{dV = 270\,cm^3}$

$V \pm dV = 27{,}000 \pm 270\,cm^3$

b) $S = 6x^2$

$S = 12x\,(dS)$

$S = 12(30)(0.1)$

$\boxed{dS = 36\,cm^2}$

$S \pm dS = 5400 \pm 36\,cm^2$

5. A solid steel cylinder has a radius of 2.5cm. and a height of 10 cm. A tight-fitting sleeve is to be made that will extend the radius to 2.6cm. Estimate the volume of steel needed for the sleeve

$V' = \pi\, 2rh\,(dV)$

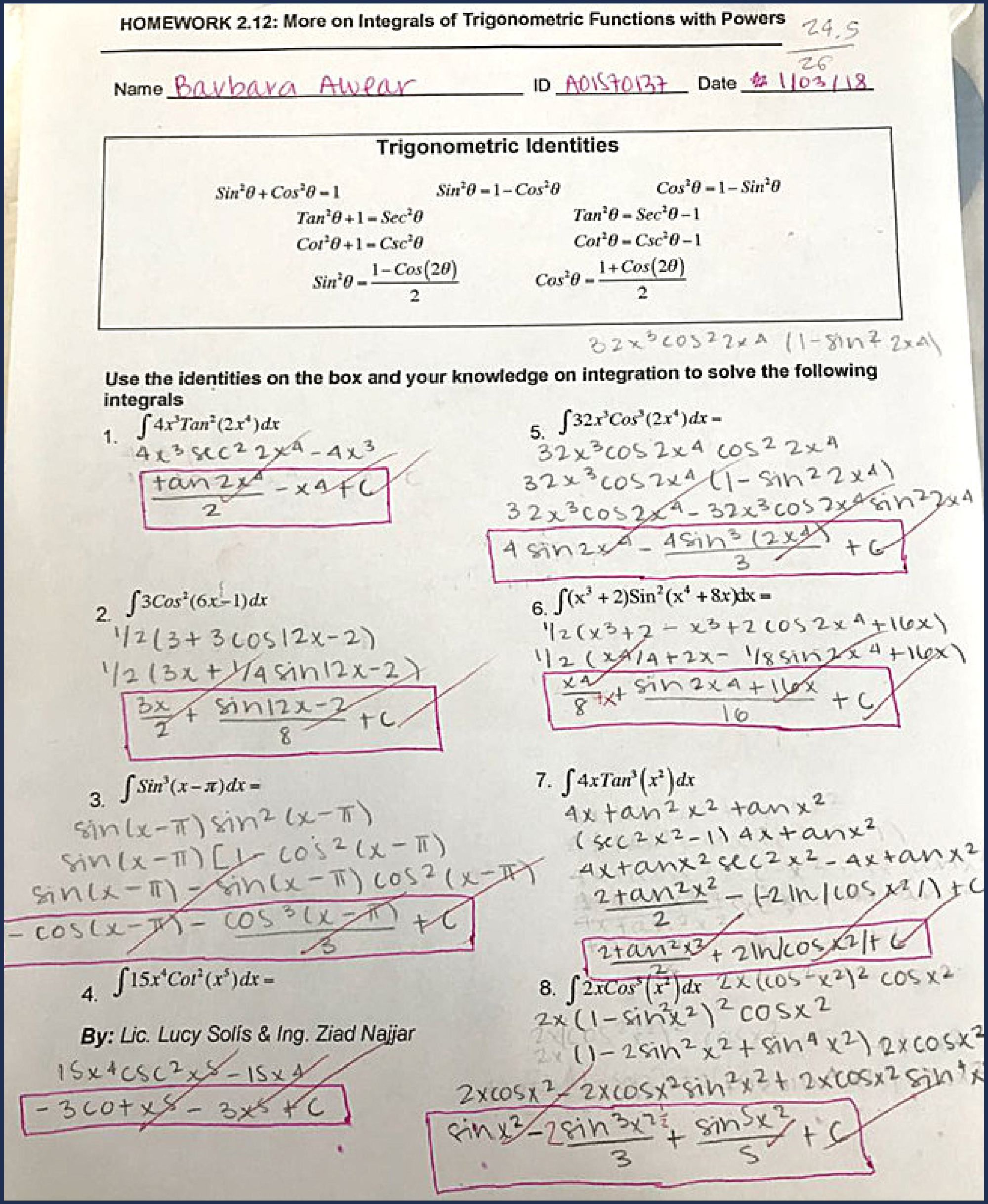
$V' = \pi\, 2(2.5)(10)(0.1)$

$\boxed{dV = 15.708\,cm^3}$

02

SECOND PARTIAL

HW 2.12: More on Integrals of Trigonometric Functions with Powers was one of the best homeworks in the second partial for it helped understood all the types of power of trigonometric integrals because it included in the same activity all the ones we had seen in the partial. It also had the trigonometric identities at the top, which helped a lot.



HOMEWORK 2.12: More on Integrals of Trigonometric Functions with Powers 24.5/26

Name Barbara Awear ID A01570137 Date 1/03/18

Trigonometric Identities

$Sin^2\theta + Cos^2\theta = 1$ $Sin^2\theta = 1 - Cos^2\theta$ $Cos^2\theta = 1 - Sin^2\theta$

$Tan^2\theta + 1 = Sec^2\theta$ $Tan^2\theta = Sec^2\theta - 1$

$Cot^2\theta + 1 = Csc^2\theta$ $Cot^2\theta = Csc^2\theta - 1$

$Sin^2\theta = \frac{1 - Cos(2\theta)}{2}$ $Cos^2\theta = \frac{1 + Cos(2\theta)}{2}$

Use the identities on the box and your knowledge on integration to solve the following integrals

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

   $4x^3 \sec^2 2x^4 - 4x^3$

   $\boxed{\frac{\tan 2x^4}{2} - x^4 + C}$

2. $\int 3Cos^2(6x-1)dx$

   $1/2(3 + 3\cos 12x - 2)$

   $1/2(3x + 1/4 \sin 12x - 2)$

   $\boxed{\frac{3x}{2} + \frac{\sin 12x - 2}{8} + C}$

3. $\int Sin^3(x-\pi)dx =$

   $\sin(x-\pi)\sin^2(x-\pi)$

   $\sin(x-\pi)[1 - \cos^2(x-\pi)]$

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

   $\boxed{-\cos(x-\pi) - \frac{\cos^3(x-\pi)}{3} + C}$

4. $\int 15x^4 Cot^2(x^5)dx =$

   $15x^4 \csc^2 x^5 - 15x^4$

   $\boxed{-3\cot x^5 - 3x^5 + C}$

5. $\int 32x^3 Cos^3(2x^4)dx =$

   $32x^3 \cos 2x^4 \cos^2 2x^4$

   $32x^3 \cos 2x^4 (1 - \sin^2 2x^4)$

   $32x^3 \cos 2x^4 - 32x^3 \cos 2x^4 \sin^2 2x^4$

   $\boxed{4\sin 2x^4 - \frac{4\sin^3(2x^4)}{3} + C}$

6. $\int (x^3+2)Sin^2(x^4+8x)dx =$

   $1/2(x^3 + 2 - x^3 + 2\cos 2x^4 + 16x)$

   $1/2(x^4/4 + 2x - 1/8 \sin 2x^4 + 16x)$

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

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

   $4x \tan^2 x^2 \tan x^2$

   $(\sec^2 x^2 - 1) 4x \tan x^2$

   $4x \tan x^2 \sec^2 x^2 - 4x \tan x^2$

   $\frac{2\tan^2 x^2}{2} - (-2\ln|\cos x^2|) + C$

   $\boxed{2\tan^2 x^2 + 2\ln|\cos x^2| + C}$

8. $\int 2x Cos^5(x^2)dx$

   $2x(\cos^2 x^2)^2 \cos x^2$

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

   $(1 - 2\sin^2 x^2 + \sin^4 x^2) 2x\cos x^2$

   $2x\cos x^2 - 2x\cos x^2 \sin^2 x^2 + 2x\cos x^2 \sin^4 x^2$

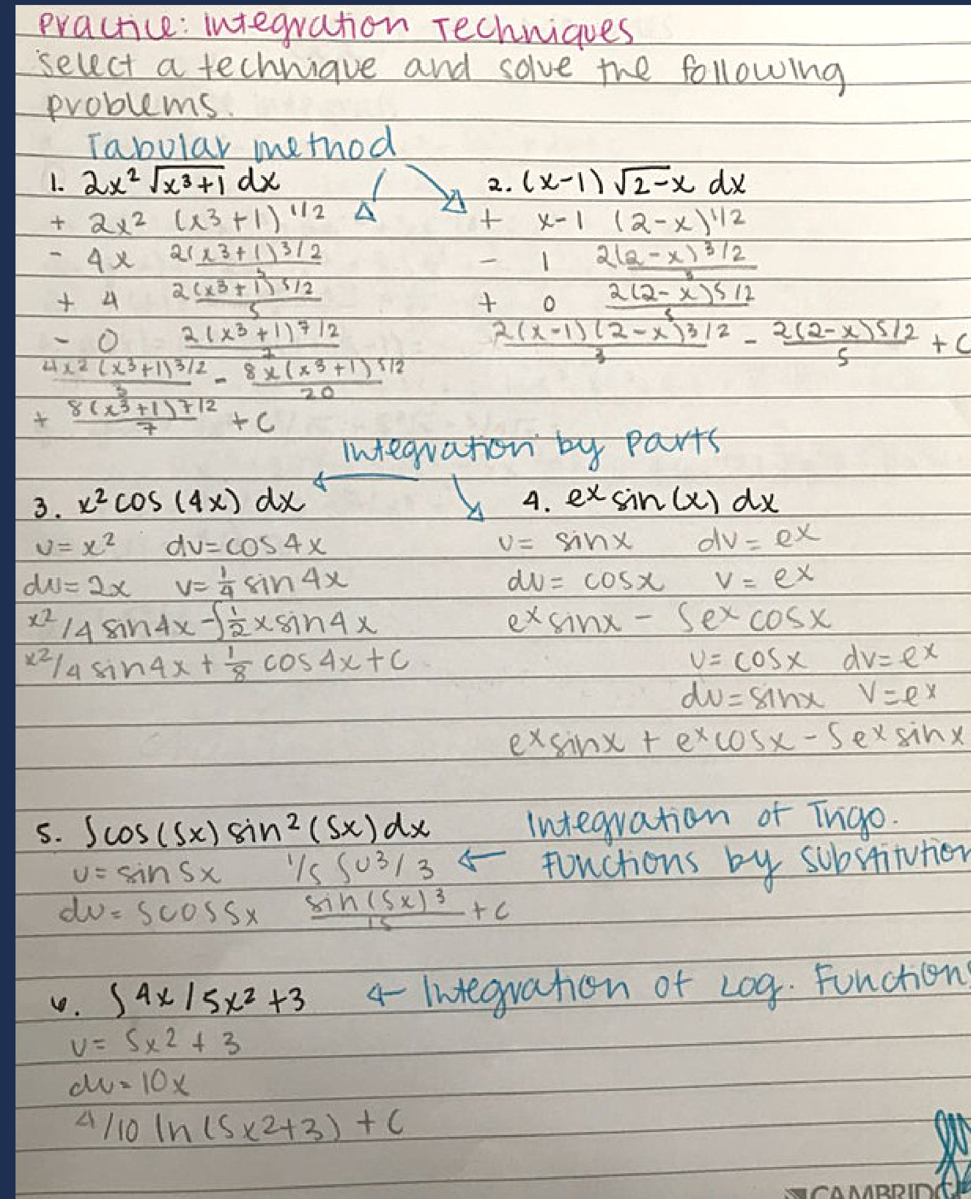
   $\boxed{\sin x^2 - \frac{2\sin^3 x^2}{3} + \frac{\sin^5 x^2}{5} + C}$

By: Lic. Lucy Solís & Ing. Ziad Najjar

03

THIRD PARTIAL

Practice: Integration Techniques was the final practice of the third partial, as well of the semester. It mainly included the types of integration we had seen in the final partial. Like in my significant activity of the second partial, this was also a review for it had almost all the types we had covered. It help understood even better how to identify which method to use.



Practice: Integration Techniques

Select a technique and solve the following problems.

Tabular method

1. $2x^2\sqrt{x^3+1}\,dx$

$+\ 2x^2 \quad (x^3+1)^{1/2}$

$-\ 4x \quad \frac{2(x^3+1)^{3/2}}{3}$

$+\ 4 \quad \frac{2(x^3+1)^{5/2}}{5}$

$-\ 0 \quad \frac{2(x^3+1)^{7/2}}{7}$

$\frac{4x^2(x^3+1)^{3/2}}{3} - \frac{8x(x^3+1)^{5/2}}{20} + \frac{8(x^3+1)^{7/2}}{7} + C$

2. $(x-1)\sqrt{2-x}\,dx$

$+\ x-1 \quad (2-x)^{1/2}$

$-\ 1 \quad \frac{2(2-x)^{3/2}}{3}$

$+\ 0 \quad \frac{2(2-x)^{5/2}}{5}$

$\frac{2(x-1)(2-x)^{3/2}}{3} - \frac{2(2-x)^{5/2}}{5} + C$

Integration by parts

3. $x^2\cos(4x)\,dx$

$u = x^2 \quad dv = \cos 4x$

$du = 2x \quad v = \frac{1}{4}\sin 4x$

$x^2/4\sin 4x - \int \frac{1}{2}x\sin 4x$

$x^2/4\sin 4x + \frac{1}{8}\cos 4x + C$

4. $e^x\sin(x)\,dx$

$u = \sin x \quad dv = e^x$

$du = \cos x \quad v = e^x$

$e^x\sin x - \int e^x\cos x$

$u = \cos x \quad dv = e^x$

$du = \sin x \quad v = e^x$

$e^x\sin x + e^x\cos x - \int e^x\sin x$ +

5. $\int\cos(5x)\sin^2(5x)\,dx$ ← Integration of Trigo. Functions by substitution

$u = \sin 5x \quad 1/5\int u^3/3$

$du = 5\cos 5x \quad \frac{\sin(5x)^3}{15} + c$

6. $\int 4x/5x^2+3$ ← Integration of Log. Functions

$u = 5x^2+3$

$du = 10x$

$4/10\ln(5x^2+3) + C$

CAMBRIDGE

CONCLUSIONS

In this semester I learned a lot about calculus, but most importantly I learned to organize myself, study hard, and put attention in class. Personally, I don't like math, but I know if I do my homework and study, I can be really good at it and do well in the exams. I was very proud of myself in this semester regarding my math grades and I know a very important part was Miss Laurita Alvarez, because she is the best math teacher I have ever had. Her way of working is really the best for me to learn, the activities were difficult but the quizzes were easy. Thank you, Miss for helping me all these semesters in high school :)