

Humberto Davila A01570253

First Partial projects



math video.mp4

Second Partial Project

Paul Villarreal A01570120
Humberto Dávila A01570253

Cálculo II

En este proyecto aplicaremos los conocimientos de derivadas e integrales que nos han sido proporcionados a lo largo de este parcial. Estamos analizando dos vehículos, un carro que tiene una aceleración constante de 5 ft/s^2 y el Expreso Tec, que tiene una velocidad constante de 35 ft/s . Ambos arrancan después de un semáforo y tenemos que determinar cuando el carro alcanza al Expreso Tec.

Primero cambiamos de ft/s a m/s , y nos dio que el carro tiene una aceleración de 1.524 m/s^2 y el Expreso tiene una velocidad de 10.668 . Usando cálculos diferenciales, igualamos las fórmulas de posición de cada uno, ya que empezarán del mismo lugar y debemos encontrar el lugar donde estén juntos. Al igualar estos datos, pudimos darnos cuenta que el carro alcanzaba al Expreso en 14 segundos.

El problema nos preguntaba cuál era la aceleración del carro en ese punto, así que sustituimos los 14 segundos en la operación de velocidad del carro, y esto nos dio que el carro tenía una velocidad de 21.336 m/s o 76.8 km/h cuando alcanzó al Expreso Tec.

$v_c(14) = 1.524(14) = 21.336 \text{ m/s}$
 $21.336(3600)/(1/1000) = 76.8 \text{ km/h}$

Proyecto 2do Parcial: Movimiento de un móvil a lo largo de una trayectoria rectilínea y circular

Objetivo:

Determinar los conceptos básicos de un movimiento circular a partir de cálculo diferencial

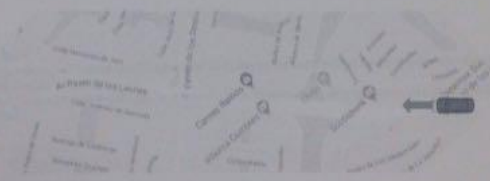
Instrucciones:

En equipos de 2 personas realizarás la siguiente actividad

1. Leer detenidamente el caso práctico de un auto y el Expreso Tec que viajan sobre la Av. Pato de los Leones en dirección Pte.
2. Evaluar en base a los datos dados y usando cálculo diferencial al recorrido de la trayectoria rectilínea
3. Determinar las ecuaciones utilizando integrales y/o derivadas (conceptos vistos en clase) y los valores que se te piden
4. Determinar los valores que se te piden del movimiento rotacional del móvil
5. Compararlos con el límite de velocidad permitido en la zona.

Un auto está esperando el cambio de luz verde del semáforo, del cruce de Av. Paseo de los Leones y Calle Cima, cuando esto sucede, el carro empieza a moverse con una aceleración constante de 5 ft/s². Un autobús Expreso Tec viaja en la misma dirección con una velocidad constante de 35 ft/s, sobrepasando al auto.

$35 \text{ ft/s} = 10.668 \text{ m/s}$ $5 \text{ ft/s}^2 = 1.524 \text{ m/s}^2$

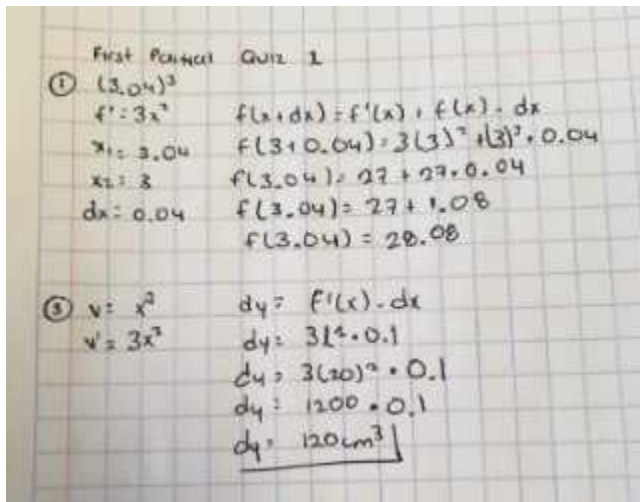
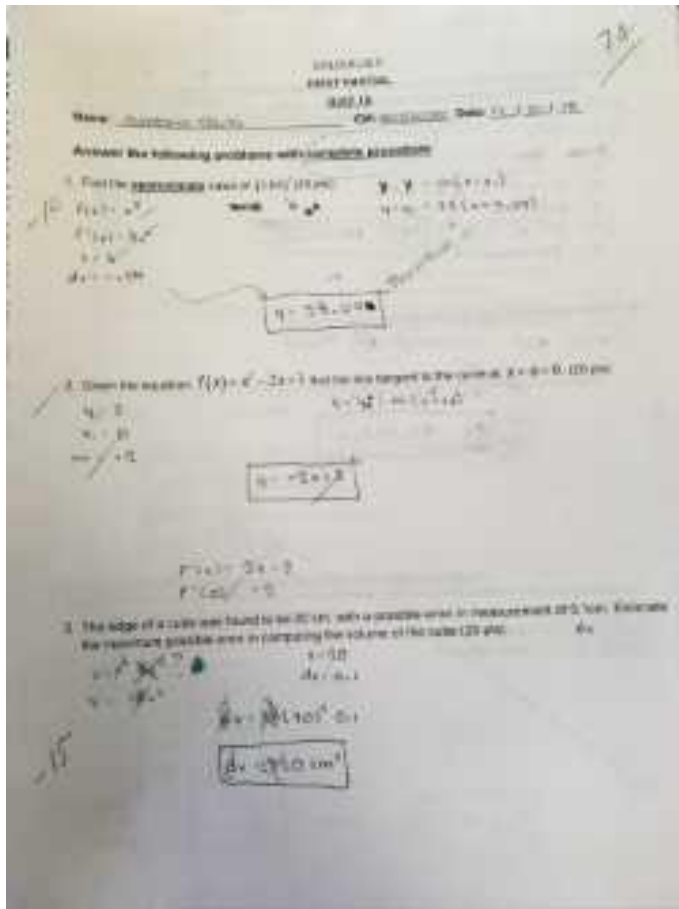


Para Cálculo II:

- a) Determina la velocidad del auto cuando alcanza al autobús

<p><u>Carro</u></p> <p>$a(t) = 1.524$</p> <p>$v(t) = 1.524t$</p> <p>$x(t) = \frac{1.524}{2} t^2$</p>	<p><u>Expreso</u></p> <p>$v(t) = 10.668$</p> <p>$x(t) = 10.668t$</p>	<p>Velocidad del carro</p> <p>$v_c(14) = 1.524(14)$</p> <p>$v_c(14) = 21.336 \text{ m/s}$</p>
<p>$x_c(t) = x_b(t)$</p>		
<p>$\frac{1.524}{2} t^2 = 10.668t$</p>		
<p>$t = \frac{2(10.668)}{1.524} = 14 \text{ s}$</p>		

Quiz 1 P1




Quiz 2 P1

Page No. _____
 Date _____

Group: _____
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1. Approximate the area of the region bounded by the graph of $f(x) = \frac{1}{x^2}$ and the x-axis from $x=1$ to $x=2$. Use the approximation with $n=4$ subintervals.



2. Evaluate the integral using the following values. SHOW THE STEPS OF YOUR PROCEEDING. (10 points)

$\int_1^2 x^2 dx = 2$ $\int_1^2 x dx = 1$ $\int_1^2 \frac{1}{x} dx = \ln 2$

$\int_1^2 (x^2 + x - \frac{1}{x}) dx = \int_1^2 x^2 dx + \int_1^2 x dx - \int_1^2 \frac{1}{x} dx = 2 + 1 - \ln 2 = 3 - \ln 2$

3. Approximate the area of a plane region using left hand, right hand and midpoint approximation.

$f(x) = 3 - x^2$ on $[1, 5]$ $n=4$ subintervals (10 points)

x	$f(x)$	Δx	h
1	2	1	0
2	1	1	1.25
3	0	1	2.5
4	-3	1	3.75
5	-12	1	5

Area of Left hand = $10 - 7.5 = 2.5$
 Area of Right hand = $-15 - 9.5 = -24.5$

Midpoint = 14.625 ± 3

Quiz 1 and 2 P2

Page No. _____
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 Paper: _____

1. Solve the following integral. SHOW THE STEPS OF YOUR PROCEEDING. (10 points)

a. $\int \frac{1}{x^2} dx = \int x^{-2} dx = \frac{x^{-2+1}}{-2+1} = \frac{x^{-1}}{-1} = -\frac{1}{x} + C$

b. $\int \frac{1}{x^2+1} dx = \int \frac{1}{x^2+1} dx = \tan^{-1}(x) + C$

c. $\int \frac{1}{x^2+4} dx = \int \frac{1}{x^2+2^2} dx = \frac{1}{2} \tan^{-1}\left(\frac{x}{2}\right) + C$

d. $\int \frac{1}{x^2+9} dx = \int \frac{1}{x^2+3^2} dx = \frac{1}{3} \tan^{-1}\left(\frac{x}{3}\right) + C$

e. $\int \frac{1}{x^2+16} dx = \int \frac{1}{x^2+4^2} dx = \frac{1}{4} \tan^{-1}\left(\frac{x}{4}\right) + C$

f. $\int \frac{1}{x^2+25} dx = \int \frac{1}{x^2+5^2} dx = \frac{1}{5} \tan^{-1}\left(\frac{x}{5}\right) + C$

g. $\int \frac{1}{x^2+36} dx = \int \frac{1}{x^2+6^2} dx = \frac{1}{6} \tan^{-1}\left(\frac{x}{6}\right) + C$

h. $\int \frac{1}{x^2+49} dx = \int \frac{1}{x^2+7^2} dx = \frac{1}{7} \tan^{-1}\left(\frac{x}{7}\right) + C$

i. $\int \frac{1}{x^2+64} dx = \int \frac{1}{x^2+8^2} dx = \frac{1}{8} \tan^{-1}\left(\frac{x}{8}\right) + C$

j. $\int \frac{1}{x^2+81} dx = \int \frac{1}{x^2+9^2} dx = \frac{1}{9} \tan^{-1}\left(\frac{x}{9}\right) + C$

- Q. 1. (a) Verify that $f(x) = \sin(x)$ is a solution of the differential equation $f''(x) + f(x) = 0$.
 (b) Verify that $f(x) = \cos(x)$ is a solution of the differential equation $f''(x) + f(x) = 0$.
 (c) Verify that $f(x) = e^x$ is a solution of the differential equation $f'(x) = f(x)$.
 (d) Verify that $f(x) = e^{-x}$ is a solution of the differential equation $f'(x) = -f(x)$.
 (e) Verify that $f(x) = x^2$ is a solution of the differential equation $f''(x) = 2$.

Q. 2. Solve the following problems, show all your steps and hence give final answer. (10 marks each)

If the velocity of a particle at any time t is $v = 3t^2 - 4t + 5$ and the velocity at $t = 0$ is 5 m/s, then find the equation of the path of the particle at any time t .

$$\int v dt = \int (3t^2 - 4t + 5) dt = 3t^3/3 - 4t^2/2 + 5t + C$$

$$s = t^3 - 2t^2 + 5t + C$$

At $t = 0$, $s = 0$

$$0 = 0 - 0 + 0 + C \Rightarrow C = 0$$

$$s = t^3 - 2t^2 + 5t$$

Q. 3. Find the antiderivatives or integral of the following problems, SHOW YOUR ENTIRE PROCEDURES. (10 marks)

(a) $\int (x^2 + 2x + 1) dx = x^3/3 + x^2 + x + C$
 (b) $\int (2x + 1) dx = x^2 + x + C$
 (c) $\int \frac{1}{x^2} dx = \int x^{-2} dx = -x^{-1} + C = -1/x + C$
 (d) $\int \cos(x) dx = \sin(x) + C$
 (e) $\int \sin(x) dx = -\cos(x) + C$
 (f) $\int e^x dx = e^x + C$
 (g) $\int \frac{1}{x} dx = \ln|x| + C$
 (h) $\int \frac{1}{x^2 + 1} dx = \tan^{-1}(x) + C$
 (i) $\int \frac{1}{\sqrt{1-x^2}} dx = \sin^{-1}(x) + C$
 (j) $\int \frac{1}{\sqrt{1+x^2}} dx = \sinh^{-1}(x) + C$

second part of Quiz 1

① $v(x) = \frac{1}{3} \sin^2(2x+2) \cos(2x+2)$ $u = \sin(2x+2)$
 $\frac{du}{dx} = 2 \cos(2x+2)$

$\frac{1}{2} \frac{du^2}{u} = \frac{1}{3} \frac{du^2}{u}$

$v(x) = \frac{1}{6} \sin^2(2x+2) + C$

② $v(x) = \frac{e^{3x}}{9e^4} \Rightarrow v(x) = \frac{1}{3e^4} e^{3x}$ $u = e^{3x}$
 $\frac{du}{dx} = 3e^{3x} = \frac{3}{u}$

$v(x) = -\frac{e^{3x}}{18} + C$

Quiz 2

③ $\int_0^c \cos^2(x^3) dx = \frac{1}{2} \int_0^c (1 + \cos 2x^3) dx = \frac{1}{2} \left[\frac{x^3}{3} + \frac{1}{14} \sin 2x^3 \right] + C$
 $\frac{x^3}{6} + \frac{\sin 2x^3}{28} + C$

④ $\int_0^c \sin^2(x^4) dx = \frac{1}{2} \int_0^c (1 - \cos 2x^4) dx$
 $= \frac{1}{2} \left[\frac{x^4}{4} - \frac{1}{8} \sin 2x^4 \right] + C$
 $\frac{x^4}{8} - \frac{\sin 2x^4}{16} + C$

Quiz 1 P3

Section 8.1: Integration

Directions: Circle the correct answer.

1. The integral of $\int (2x^2 + 4x - 3) dx = \frac{2}{3}x^3 + 2x^2 - 3x + C$

A

2. The integral of $\int (x^2 + 2x - 1) dx = \frac{1}{3}x^3 + x^2 - x + C$

B

3. The partial fraction decomposition of the integral $\int \frac{x^2 + 4}{x^2 - 4x + 4} dx = \frac{1}{x} + \frac{2}{x-2} + \frac{1}{x+2}$

C

4. The integral of $\int \frac{x^2 - 2x + 1}{x^2 + 2x} dx = \frac{1}{2} \ln|x+2| - \frac{1}{2} \ln|x| + C$

D

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

$$\int \frac{x^2 - 2x + 1}{x^2 + 2x} dx$$

$$\left(\frac{2}{x} \ln|x+2| - \frac{1}{2} \ln|x| + C \right)$$

Different problem on the worksheet

5. $\frac{0.2x^2 - 4x - 15}{x^2 - 9}$

$x^2 - 9 = (x-3)(x+3)$

$\frac{0.2x^2 - 4x - 15}{(x-3)(x+3)}$

$\frac{A}{x-3} + \frac{B}{x+3}$

$A(x+3) + B(x-3) = 0.2x^2 - 4x - 15$

$Ax + 3A + Bx - 3B = 0.2x^2 - 4x - 15$

$(A+B)x + (3A-3B) = 0.2x^2 - 4x - 15$

$A+B = 0$

$3A-3B = -4$

$A = -B$

$3(-B) - 3B = -4$

$-3B - 3B = -4$

$-6B = -4$

$B = \frac{2}{3}$

$A = -\frac{2}{3}$

$\frac{-\frac{2}{3}}{x-3} + \frac{\frac{2}{3}}{x+3}$

$\frac{-2}{3(x-3)} + \frac{2}{3(x+3)}$

Quiz 2 P3

Handwritten title or header text, possibly including a date and subject name.

Handwritten introductory text or instructions for the exercises.

Exercise 1: Handwritten text and a small diagram or symbol.

Exercise 2: Handwritten text and a diagram showing two parallel lines with arrows.

Exercise 3: Handwritten text and a diagram showing two parallel lines with arrows.

Exercise 4: Handwritten text and a diagram showing two parallel lines with arrows.

Exercise 5: Handwritten text and a diagram showing two parallel lines with arrows.

Quiz 2

$$\textcircled{2} \int e^{5x} \cos 4x dx \quad u = \cos 4x \quad dv = e^{5x}$$

$$du = -4 \sin 4x \quad v = \frac{e^{5x}}{5}$$

$$= \frac{4e^{5x} \sin 4x + 5e^{5x} \cos 4x}{41}$$

$$\frac{e^{5x}}{41} [4 \sin 4x + 5 \cos 4x] + C$$

$$\textcircled{3} \int e^{2x} x^2 dx \quad u = x^2 \quad dv = e^{2x}$$

$$du = 2x$$

$$v = \frac{e^{2x}}{2}$$

$$\frac{x^2 e^{2x}}{2} - \int x e^{2x} dx$$

$$u = x \quad dv = e^{2x}$$

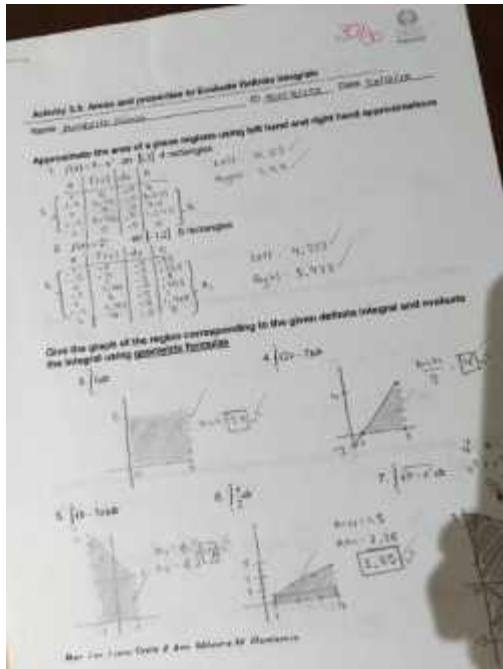
$$du = 1 \quad v = \frac{e^{2x}}{2}$$

$$\frac{x e^{2x}}{2} - \int \frac{e^{2x}}{2} dx$$

$$\frac{x^2 e^{2x}}{2} - \frac{x e^{2x}}{2} + \frac{e^{2x}}{4}$$

$$\frac{1}{2} x^2 e^{2x} - \frac{1}{2} x e^{2x} + \frac{1}{4} e^{2x} + C$$

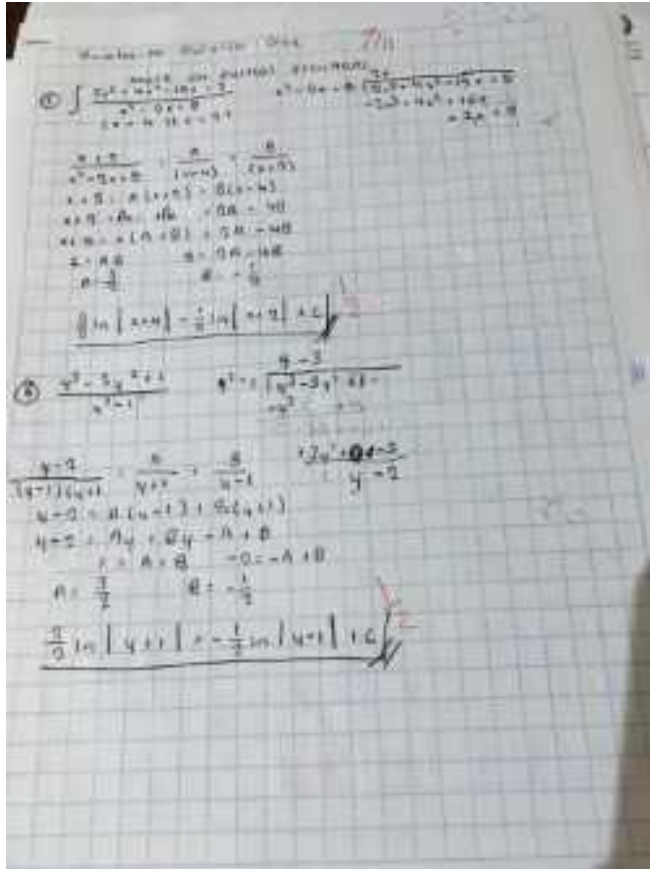
Activities P1, P2 and P3



Riemann Sums was one of the easiest topics during this course, as well as one of the most effective way to get areas under a curve. I enjoyed this activity.



Out of all the integral topics, the indefinite ones were the ones that I learned quicker and better, and that is why I chose this activity. Based on this topic I managed to learn better the other ones.



The activity above is a Partial fractions activity, which was one of the “funniest” topics to learn because of the way you mess up getting the values of A, B and C. At the end I think I dominated this topic.

In general, I always like my Math courses throughout each semester, and this one was no exception. Math and Physics are my favorite subjects and I feel that the topics learned in this Calculus course are a good preparation for the career I’ve chosen. Having a good teacher obviously had a great impact on this course.