Ch 7 Review

Edward A Esten

Sect. 7.1 # 9

9 $\int e^x \sin x\,dx$

$\int e^x \sin x\,dx = -e^x \cos x + \int e^x \cos x\,dx$

$\int e^x \sin x\,dx = -e^x \cos x + e^x \sin x - \int e^x \sin x\,dx$

$2\int e^x \sin x = e^x \sin x - e^x \cos x + C$

$$\boxed{\int e^x \sin x\,dx = \frac{e^x}{2}(\sin x - \cos x) + C}$$

Integration by parts is crucial to solving "unsolvable" integrals. this problem and type of problems is really enlightening.

[illegible] Butler
9 NOV 09

Chapter 7 Review Problem

$\boxed{7.1.1}$

Integration by Parts

$\int x \sin x \, dx$

$u = x \qquad dv = \sin x$
$du = 1 \qquad v = -\cos x$

$$-x\cos x + -\int \cos(x)\, dx$$

$$\boxed{-x\cos x - \sin x + C}$$

Ch 7 Review Problem

James Allen

DATE

$\boxed{7.2}$

#5 $\int \sin^5 x \cos^2 x \, dx$

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

$u = \cos x \quad du = -\sin x \, dx$

$= \int (1-u^2)^2 u^2 (-du)$

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

$= \int u^2 - 2u^4 + u^6 (-du)$

$= \left[\frac{1}{3}u^3 - 2\left(\frac{1}{5}u^5\right) + \frac{1}{7}u^7\right] - 1$

$= -\frac{1}{3}\cos^3 x + \frac{2}{5}\cos^5 x - \frac{1}{7}\cos^7 x + C$

Daniel Rodriguez
Math 1270

Chapter 7 Review

$\boxed{7.2}$ $\int_0^{2\pi} |\cos x - \sin x| dx$

Split the two functions

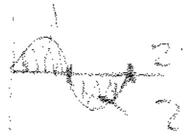
$\int_0^{2\pi} \cos x - \int_0^{2\pi} \sin x$

Integrate

$\sin x \Big|_0^{2\pi} - -\cos x \Big|_0^{2\pi} \Rightarrow \sin x \Big|_0^{2\pi} + \cos x \Big|_0^{2\pi}$

The graphs of sin & cos fluctuate over the x axis

sin →



cos

N[illegible] must get all area

$\sin x \Big|_0^{\pi} \cdot 2 + 4 \cdot$ [illegible] $\Big|_0^{\pi/4}$

$(\sqrt{2} - 0) \cdot 2 + 4\left(\frac{\sqrt{2}}{2} + 0\right) = 2\sqrt{2} + 2\sqrt{2} = \underline{4\sqrt{2}}$

Jean Paul Santos
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CH 7 Review Problem
CH 7 Sec 2 # 16

Q: 16. $\int \sin^2 x \cos^2 2x \quad dx$

A: $\int \left[\frac{1}{2}(1-\cos 2x)\ \frac{1}{2}\left(1+\cos 4x\right)\right].$

$\frac{1}{4}\int (1-\cos 2x)(1+\cos 4x)\ dx$

$\to \frac{1}{4}\int (1-\cos 2x+\cos 4x-\cos 2x\cos 4x)\ dx$

$\swarrow$

$\frac{1}{4}\left(\int dx - \underset{\substack{u=2x\\du=2dx}}{\int \cos 2x\,dx} + \underset{\substack{u=4x\\du=4dx}}{\int \cos 4x\,dx} - \int \cos 2x\cos 4x\ dx\right)$

$\swarrow \qquad \qquad \swarrow$

$\frac{1}{4}\left(x - \frac{\sin 2x}{2} + \frac{\sin 4x}{4}\right. \qquad -\left(\frac{1}{2}\cos 6x + \frac{1}{2}\cos 2x\right)$

$-\left(\frac{1}{2}\underset{\substack{u=6x\\du=6dx}}{\int \cos 6x\,dx} + \frac{1}{2}\underset{\substack{u=2x\\du=2d}}{\int \cos 2x\,d}\right.$

$-\left(\frac{\sin 6x}{12} + \frac{\sin 2x}{4}\right)$

$\frac{1}{4}\left(x - \frac{\sin 2x}{2} + \frac{\sin 4x}{4} - \frac{\sin 6x}{12} - \frac{\sin 2x}{4} + C\right)$

$$\boxed{\frac{x}{4} - \frac{\sin 2x}{8} + \frac{\sin 4x}{16} - \frac{\sin 6x}{48} - \frac{\sin 2x}{16} + C}$$

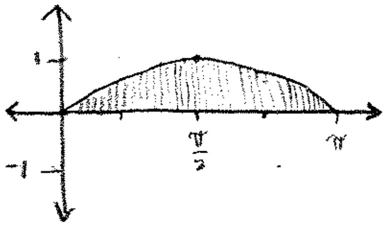
Reason: The reason why I like this problem is <u>because</u> it's fun; You have to apply many trig identities to the problem in order to integrate the function. This problem requires a lot of problem solving skills like a puzzle; thus, you need to know algebra and how to apply u-substitution techniques to solve an integration problem.

Alyssa Lolofie
Math 1270
Review Problem

Chapter 7 Review Problem:

Q. The area under $y=\sin x$ from 0 to π is positive. Which frequencies p have $\int_0^{\pi} \sin px\, dx = 0$?

A.



$$\text{so}\ldots \int_0^{\pi} \sin px\, dx = 0 \qquad u = px \quad du = p\,dx$$
$$= \frac{1}{p}\int_0^{\pi} \sin u\, du \qquad u = p\pi \quad u = p\cdot 0$$
$$= \frac{1}{p}\int_0^{p\pi} \sin u\, du$$
$$= -\frac{1}{p}\cos u \Big|_0^{p\pi}$$
$$= -\frac{1}{p}\cos p\pi + \frac{1}{p}\cos 0$$
$$\text{so}\ldots \frac{\cos 0}{\cancel{p}} = \frac{\cos p\pi}{\cancel{p}}$$
$$1 = \cos p\pi \qquad p = 2 \text{ or } 4 \text{ or } 6$$
$$\ldots \boxed{p = \text{even number!}}$$

R. This is a good problem because you need to consider the graph of $\sin(x)$ and what pieces/frequencies will shift it and how they will! Integrating and trigonometry need to be combined to test your knowledge! woohoo.

AKASH AGARWAL

Ch. 7 Review Problem

7.3

(a) $\int \frac{x^2\,dx}{\sqrt{1+x^2}}$

$x = \tan\theta \quad \Rightarrow \theta = \tan^{-1}x$

$\int \frac{\tan^2\theta}{\sqrt{1+\tan^2\theta}}\,d\theta$

$\int \frac{\tan^2\theta}{\cancel{\sec\theta}}\,d\theta \cdot \sec^{\cancel{2}}\theta$

$\int \tan^2\theta \sec\theta\,d\theta$

$\int \sin^2\theta\,d\theta$

$\int \frac{1}{2} - \frac{\cos 2\theta}{2}\,d\theta$

$\frac{\theta}{2} - \frac{\sin 2\theta}{4} + c$

$\frac{\tan^{-1}x}{2} \quad \frac{\sin 2(\tan^{-1}x)}{4} + c$

Chapter 7 review Problem

Jared Pieper
V0653900

7.4 #3 $\frac{1}{(x-3)(x-2)} = \frac{A}{(x-3)} + \frac{B}{(x-2)}$

$Ax - 2A + Bx - 3B = 1$

$x^1 : 0 = A + B$ $\quad A = 1 \quad B = -1$

$x^0 : 1 = -2A - 3B$

$$\Downarrow$$

$$\boxed{\frac{1}{(x-3)} - \frac{1}{(x-2)}}$$

this problem is awesome demonstration of partial fractions

Jesse

CH 7 REVIEW

7.4 #12

Q) $\frac{x}{x^2-4} = ?$

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

Numerator: $x = Ax + 2A + Bx - 2B$

$x^1 = \quad 1 = A + B \quad (A = 1 - B) \Rightarrow$

$x^0 = 0 = 2A - 2B$

$0 = 2(1-B) - 2B \Rightarrow 0 = 2 - 2B - 2B \Rightarrow 4B = 2 \Rightarrow$

$\underline{B = \frac{1}{2}}$; $(A = 1 - B) \Rightarrow A = 1 - \frac{1}{2} \Rightarrow \underline{A = \frac{1}{2}}$

$\Rightarrow \boxed{\frac{x}{x^2-4} = \frac{1}{2x-4} + \frac{1}{2x+4}}$

Best Ch 7 Prob

7.4. Braydon Brassy

11. $\frac{1}{x^2(x-1)} \Rightarrow x, x^2, (x-1),$

$1 = A(x)(x-1) + B(x-1) + C(x^2)$

$x=1$

$1 = 0 + 0 + 1C$

$\underline{1 = C}$

$x=0$

$1 = 0 + -1B + 0$

$\underline{-1 = B}$

$x=2 \quad 1 = 2A + 1(-1) + 4(1)$

$-2 = 2A, \ \underline{A = -1}$

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

This is the most important skill in chapter 7 because it allows for integration by partial fraction decomposition. This problem is good framework for other problems and also needs to be solved for A because it will not cancel.

Sergio
Diazuela

Chapter 7 review

7.4 problem 5 - Not too hard, not too easy

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

$$\frac{A}{x}+\frac{B}{x+1}+\frac{C}{x+2}$$

$A(x+1)(x+2)+B(x+2)(x)+C(x)(x+1)$
$A\,x^2+3x+2 + B\,x^2+2x + C\,x^2+x$

$x^2: 1 = A+B+C$
$x^1: 0 = 3A+2B+C$
$x^0: 1 = 2A$

$\boxed{A=\frac{1}{2}}$

$1=\frac{1}{2}+B+C$
$0=\frac{3}{2}+2B+C$
$(\frac{1}{2}=B+C)\ -2$
$-\frac{3}{2}=2B+\cancel{C}$
$-\frac{1}{2}=-\cancel{B}-\cancel{C}$
$\boxed{B=-2}$

$1=\frac{1}{2}-2+C$
$\frac{1}{2}=-2+C$
$\boxed{\frac{5}{2}=C}$

$$\boxed{\frac{1}{2x}+\frac{(-2)}{(x+1)}+\frac{5}{2\,(x+2)}}$$

Kyle Crandall

chapter 7 problem

$$\int_1^{\infty} \frac{1}{x^c}\,dx$$

$$= \lim_{t \to \infty} \int_1^t \frac{1}{x^c}\,dx = \lim_{t \to \infty} \left(\frac{x^{1-c}}{1-c}\right)_1^t = \lim_{t \to \infty} \overset{\nearrow 0}{\left(\frac{1}{x^{c-1}(1-c)}\right)} - \frac{1}{1-c} = \frac{1}{e-1}$$

I think this is a good question because it teaches you a lot about math

U0621671
Christian Holbert

7 review problem

9 7.4 $\frac{(3x^2)}{(x^2+1)}$ take the partial fraction

$$x^2+1 \overset{3}{\overline{\big)\,3x^2}}$$

$$\underline{-(3x^2+3)}$$

$$-3$$

~~$3x^2+3$~~

$$\boxed{= 3 - \frac{3}{x^2+1}}$$

AB

this problem works because we need to know exactly what a partial fraction is it how I use long division

Bret Allison

MATH 1270 - Ch. 7 review problem

7.4.5

write the decomposition of $\frac{x^2+1}{x(x+1)(x+2)}$

$$= \frac{A}{X} + \frac{B}{x+1} + \frac{C}{x+2}$$

$$x^2+1 = A(x+1)(x+2) + B(x)(x+2) + C(x+1)(x)$$
$$= A(x^2+3x+2) + B(x^2+2x) + C(x^2+x)$$

$x^2:\quad 1 = A + B + C$

$x^1:\quad 0 = 3A + 2B + C$

$x^0:\quad 1 = 2A$

so $A = 1/2 \quad C = \frac{5}{2} \quad B = -2$

$1/2 = B + C$

$\boxed{B} = 1/2 - C$

$-3/2 = 2(1/2 - C) + C$

$-3/2 = 1 - 2C + C$

$-\frac{5}{2} = -C$

$C = \frac{5}{2}$

$$\boxed{\frac{1}{2x} - \frac{2}{(x+1)} + \frac{5}{2(x+2)}}$$

Mike Haley
Math 1270

Chapter 7 Review

I really liked Problems 33 + 34 in section 7.5 exercises. It allows us to take what we have learned & apply it to real world situations. It isn't just straight up math w/ no point, to us.

Ricardo Ortega Chap 7 review prob

7.5 prob 7

$\int_0^1 \frac{\ln x}{x}\,dx \quad \lim_{t\to 0}\int_t^1$ $\quad u = \ln x$

$du = \frac{1}{x}\,dx$

$\int \frac{u}{\cancel{x}}\cancel{x}\,du$ $\quad \cancel{x}\,du = dx$

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

$\lim_{t\to 0} \frac{1}{2}\Big|_t^1 \ln(x)^2 \quad \lim_{t\to 0} \Big| \frac{1}{2}\ln(1)^2 - \frac{1}{2}\ln(t)^2$

$0 - (\infty) = -\infty$

Its a good problem because its a simple problem.