Evaluate $\int \frac{\cos^5(x)}{\sin^2(x)} dx$.

$\frac{\cos x \cos^4 x}{\sin^2 x} \quad \frac{(1-\sin^2 x)^2}{\sin^2 x} \quad \cos x$

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

$$\int \left((\sin x)^{-2} - 2 + (\sin x)^2\right)\cos x\,dx$$

$\frac{(6)(4)}{(3)} = \left(\frac{6}{3}\right)\left(\frac{4}{3}\right)$

$(2)(4)$

$$\int \left((\sin x)^{-2}\cos x - 2\cos x + (\sin x)^2\cos x\right)dx$$

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

$\int \sec^8 x \, dx$

$\int (\sec^2 x)^3 \sec^2 x$

$(1+\tan^2 x)^3 \sec^2 x$

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

$21(x^3+5)^7$

$4(\csc\theta)^2 = x$

$8(\csc\theta)^1(-\csc\theta\cot\theta)\,d\theta$

$-8\csc^2\theta\cot\theta\,d\theta = dx$ $= d$

$(1+\cot^2\theta)^2 \csc^2\theta$

$(1+2\cot^2\theta+\cot^4\theta)\csc^2\theta$

$\csc^2\theta + 2(\cot\theta)^2\csc^2\theta + (\cot\theta)^4\csc^2\theta$

John Abbott College: May and December 2011 Final Exam Questions

Set A

2. Evaluate the following integrals.

(3) (a) $\int \frac{x^2}{\sqrt{x-4}}dx$

(4) (b) $\int \frac{x \arcsin(x^2)}{\sqrt{1-x^4}}dx$

(4) (c) $\int_0^{\pi/4} \sqrt{\tan x}\sec^4 x dx$

(5) (d) $\int (\cos^2\theta + \sin^3\theta)d\theta$

(4) (e) $\int \frac{\sqrt{9x^2-4}}{x}dx$

(4) (f) $\int \frac{6x^2-5x-1}{(x-2)(x^2+9)}dx$

(4) (g) $\int 16x(\arctan(4x))dx$

Set B

(5) (a) $\int_1^5 \frac{x+2}{\sqrt{2x-1}}dx$

(5) (b) $\int \frac{1}{x^3\sqrt{x^2-4}}dx$

(5) (c) $\int \frac{\tan^{-1}x}{x^2}dx$

(5) (d) $\int \frac{\sec^4\sqrt{x}\,\tan^2\sqrt{x}}{\sqrt{x}}dx$

(5) (e) $\int_0^{\frac{1}{2}} \frac{x+\arccos x}{\sqrt{1-x^2}}dx$

(5) (f) $\int \frac{e^x}{\sqrt{3-2e^x-e^{2x}}}dx$

(5) (g) $\int \frac{3x^2-2}{x^2-2x-8}dx$

(b) $\int \frac{x \sin^{-1} x^2 \, dx}{\sqrt{1-x^4}}$

$u = \sin^{-1} x^2$

$du = \frac{2x}{\sqrt{1-x^4}} dx$

$\frac{du}{2} = \frac{x \, dx}{\sqrt{1-x^4}}$

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

$\frac{1}{4} u^2 + C$

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

$\cot^4\theta \csc^2\theta$

$u = \cot\theta$

$du = -\csc^2\theta\, d\theta$

$-\int u^4\, du$

$$4\sec^2\theta = x$$

$$4(\sec\theta)^2 = x$$

$$8(\sec\theta)^1 \sec\theta\tan\theta\, d\theta = dx$$

$$8\sec^2\theta\tan\theta\, d\theta = dx$$

Attachments

Bonus Soln - Fox Population.doc