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YEAR 12 – ADVANCED MATHS

REVIEW TOPIC (SP1)

**DERIVATIVE & INTEGRAL OF
TRIGONOMETRIC FUNCTIONS**

CEM – REVIEW TOPIC – TRIG FNS DERIVATIVE & INTEGRALS – SP1

PAST HSC EXAMINATION QUESTIONS:

HSC '97

(1) (e) Using the table of standard integrals, find $\int \sec 3x \tan 3x \, dx$.

$$\frac{1}{3} \sec 3x + c$$

(2) (a) (ii) Differentiate $\frac{\cos x}{x}$

$$\frac{-x \sin x - \cos x}{x^2}$$

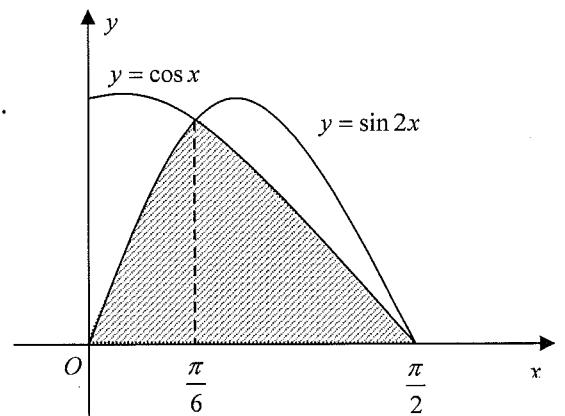
HSC '97

(4) (c) The diagram shows the graphs of the functions

$y = \cos x$ and $y = \sin 2x$ between $x = 0$ and $x = \frac{\pi}{2}$.

The two graphs intersect at $x = \frac{\pi}{6}$ and $x = \frac{\pi}{2}$.

Calculate the area of the shaded region.



$$\frac{3}{4} \text{ units}^2$$

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HSC '96

(3) (ii) Differentiate $\cos^2 x$

$$\boxed{-2 \sin x \cos x}$$

(b) Find $\int \sec^2 6x \, dx$

$$\boxed{\frac{1}{6} \tan 6x + c}$$

HSC '95

(4) (c) (ii) Find $\int_0^{\frac{\pi}{2}} \sin 2x \, dx$

$$\boxed{1}$$

HSC '94

(3) (a) (ii) Differentiate $\cos(x^2)$.

$$\boxed{-2x \sin(x^2)}$$

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HSC '93

(3) (a) Differentiate $\sin(3x+1)$.

$$\boxed{3 \cos(3x+1)}$$

(c) (ii) Find $\int_0^{\frac{\pi}{4}} \sin 2x \, dx$

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

HSC '92

(1) (a) (iii) Differentiate $x \sin x$

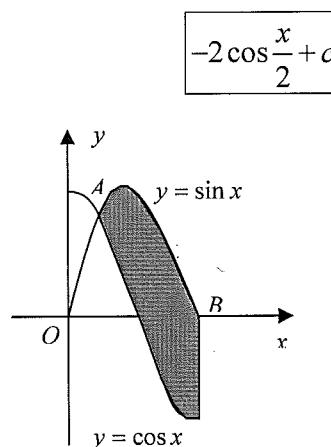
$$\boxed{\sin x + x \cos x}$$

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(b) (ii) Find $\int \sin \frac{x}{2} dx$

(9) (a) The diagram shows part of the curves $y = \sin x$ and $y = \cos x$.

(i) Find the coordinates of the two marked points A and B .



$$A\left(\frac{\pi}{4}, \frac{\sqrt{2}}{2}\right), B(\pi, 0)$$

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- (ii) Calculate the area of the shaded region.

$1 + \sqrt{2}$ sq. units

- (iii) Let m be a negative number. Show that the equation $\sin x = mx$ has $x = 0$ as its only solution satisfying $-\pi \leq x \leq \pi$.

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HSC '91

(1) (a) (i) Differentiate $\tan 3x$

$$3 \sec^2 3x$$

HSC '90

(3) (b) (ii) Differentiate $2 \sin x + \sqrt{x}$

$$2 \cos x + \frac{1}{2\sqrt{x}}$$

(c) (ii) Find $\int (\cos x + 5x^2) dx$

$$\sin x + \frac{5x^3}{3} + c$$

HSC '89

(3) (a) (ii) Differentiate $x \cos x$

$$\cos x - x \sin x$$

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HSC '88

(2) (b) (ii) Find correct to one decimal place the value of :

$$\int_0^{\frac{\pi}{4}} \cos 3x \, dx$$

0.2

HSC '86

(3) (i) Differentiate $\tan \frac{x}{3}$

$$\frac{1}{3} \sec^2 \frac{x}{3}$$

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(4) (i) (b) Find $\int_0^{\pi} \cos 2x \, dx$

$\frac{1}{2}$

HSC '85

(3) (i) (b) Evaluate $\int_0^{\frac{\pi}{2}} \sec^2 \frac{\theta}{2} \, d\theta$

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