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**(no subject)**

1 message

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Carry over  
Computer Engineering

Calculus

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

$$\frac{d}{dx} (x^2 \sin x) = 2x \sin x + x^2 \cos x$$

Let  $u = x^2$  and  $v = \sin x$   
 $u = x^2 \rightarrow u' = 2x$   
 $v = \sin x \rightarrow v' = \cos x$   
 $(2x)(\sin x) + (x^2)(\cos x)$   
 $= 2x \sin x + x^2 \cos x$

(2)  $\sin 7x \cos 2x$

soln

$$\sin a \cdot \cos b = \frac{1}{2} (\sin(a+b) + \sin(a-b))$$

$$\sin(7x) \cos(2x) = \frac{1}{2} (\sin(9x) + \sin(5x))$$

$$\frac{1}{2} \int \sin(9x) dx + \frac{1}{2} \int \sin(5x) dx$$

$$\frac{1}{2} \left( \frac{-\cos(9x)}{9} \right) + \frac{1}{2} \left( \frac{-\cos(5x)}{5} \right) + C$$

(3)  $\frac{(2x - 3x^2)}{x^2} = \frac{2 - 6x}{x}$

(4)  $\frac{2}{x} - 6x$

$$u = 3t$$

Let  $u = 3t$ , from which  $\frac{du}{dt} = 3$   $du = 3dt$  and let  $du = e^{2t} dt$

$$\int 3te^{2t} dt = (3t) \left( \frac{1}{2} e^{2t} \right) - \int \left( \frac{1}{2} e^{2t} \right) 3(3dt) = \frac{3}{2} te^{2t} - \frac{9}{2} \int e^{2t} dt$$

$$= \frac{3}{2} te^{2t} - \frac{9}{2} \left( \frac{e^{2t}}{2} \right) + C$$