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19/mhs or /152  
Math 104  
mbs

⑤  $\sin 7x \cos 2x$   
 $A = 7x, B = 2x$

Recall

$$\begin{aligned}\sin A \cos B &= \frac{1}{2} (\sin(A+B) - \sin(A-B)) \\ &= \frac{1}{2} (\sin(9x) - \sin(5x)) dx \\ &= \frac{1}{2} \left( \frac{-\cos 9x}{9} - \left( \frac{-\cos 5x}{5} \right) \right) dx \\ &= \frac{1}{2} \left( \frac{-\cos 9x}{9} - \frac{\cos 5x}{5} \right) dx \\ &= \frac{1}{2} \left( \frac{\log 9x}{9} + \frac{\log 5x}{5} \right) dx\end{aligned}$$

④  $\cos 5x \cos 6x$

$$\frac{1}{2} (\cos(A+B) + \cos(A-B))$$

$$A = 5x \quad B = 6x$$

$$\frac{1}{2} (\cos(11x) + \cos(-1x))$$

$$\frac{1}{2} (\sin 11x + (-\sin x))$$

$$= \frac{1}{2} (\sin 11x - \sin x)$$

③  $\int x^2 \sin x$

Recall:  $\int v du = uv - \int u dv$

$$v = x^2, \quad du = \sin x$$

$$\frac{dv}{dx} = 2x \quad u = -\cos x$$

$$dv = 2x dx$$

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

Recall  $\int x \cos x dx =$

$$= x (\sin x) + \cos x + c$$

$$x^2 \sin x - 2 (-x (\sin x) + \cos x + c)$$

$$= x^2 \sin x - 2 (-x (\sin x) - \cos + c)$$

$$= x^2 \sin x + 2x (\sin x) + 2 \cos x + c$$

