1) $(x \circ y) = (y \circ x)$ ①

$$(f \circ g) = \int_a^b w f g \, dx = \int_a^b w g f \, dx = (g \circ f)$$

$$(\alpha f \circ g) = \int_a^b w \alpha f g \, dx = \alpha \int_a^b w f g \, dx = \alpha (f \circ g)$$

$$((f+g) \circ h) = \int_a^b w (f+g) h \, dx = \int_a^b w f h + w g h \, dx$$

$$= (f \circ h) + (g \circ h)$$

$(g \circ g) = \int_a^b w g g \, dx \geq 0$ since $w, g \circ g \geq 0$

and $\int_a^b w g g \, dx = 0$ iff $g = 0$ since $w \neq 0$ for all x on $[a,b]$

2) $\int e^{ax} \sin bx =$

u	v
e^{ax}	$\cancel{\sin bx}$ $-\frac{1}{b}\cos bx$
u'	v' $\sin bx$
ae^{ax}	$\cancel{\ldots}$

$$\int e^{ax} \sin bx = -e^{ax} \cdot \frac{1}{b} \cos bx + \int \frac{a}{b} e^{ax} \cos bx$$

$\int e^{ax} \cos bx \, dx$

u	v
e^{ax}	$\frac{1}{b} \sin bx$
u'	v'
$a e^{ax}$	$\cos bx$

$$\int e^{ax} \cos bx \, dx = e^{ax} \cdot \frac{1}{b} \sin bx - \frac{a}{b} \int e^{ax} \sin bx$$