COMPUTER VISION

EXERCISE 1

(3) To prove: $(f * g) * h = f * (g * h)$

$$\Rightarrow f(t) * (g(t) * h(t))$$

$$= f(t) * \int_{-\infty}^{\infty} h(u)\, g(t-u)\, du$$

$$= \int_{-\infty}^{\infty} f(v) \int_{-\infty}^{\infty} h(u)\, g(t-v-u)\, du\, dv$$

$$= \int_{-\infty}^{\infty} h(u) \int_{-\infty}^{\infty} f(v)\, g(t-u-v)\, dv\, du$$

$$= \int_{-\infty}^{\infty} h(u)\, (f * g)(t-u)\, du$$

$$= ((f * g) * h)(t)$$

$$= \boxed{(f(t) * g(t)) * h(t)}$$

Thus, associativity for continuous case is proved.