

Q4

$$\hookrightarrow f(x) = e^{-x^2}$$

$$g(x) = e^x \quad h(x) = -x^2$$

$$j(x) = g(h(x)) = e^{-x^2}$$

$$K_j(x) = K_g(h(x)) \cdot K_h(x) = \frac{-x^2(e^{-x^2})}{e^{-x^2}} \cdot \frac{x(-2x)}{+x^2} = -2x^2$$

Verification $\Rightarrow K_f(x) = \frac{-x^2 \cdot (-2x)}{e^{-x^2}} = -2x^2 \quad \checkmark$

HW1

Q4 a) $f(x) = \sqrt{x+5}$

$$g(x) = \sqrt{x}$$

$$h(x) = x+5$$

$$j(x) = j(x) = g(h(x)) = \sqrt{x+5}$$

$$K_j(x) = K_g(h(x)) \cdot K_h(x) = \frac{h(x) g'(h(x))}{g(h(x))} \cdot \frac{x h'(x)}{h(x)}$$
$$= \frac{(x+5)(\frac{1}{2}(x+5)^{-\frac{1}{2}})(1)}{\sqrt{x+5}} \cdot \frac{x}{x+5}$$
$$= \frac{x+5}{2(x+5)} \cdot \frac{x}{x+5} = \left| \frac{x}{2(x+5)} \right| = k_g(h(x))$$

Verifikation \Rightarrow

$$K_f(x) = \frac{x(\frac{1}{2}(x+5)^{-\frac{1}{2}})(1)}{(x+5)^{\frac{1}{2}}} = \left| \frac{x}{2(x+5)} \right| \checkmark$$

b) $f(x) = \cos(2\pi x)$ $g(x) = \cos(x)$ $h(x) = 2\pi x$

$$j(x) = g(h(x)) = \cos(2\pi x)$$

$$k_j(x) = K_g(h(x)) \cdot K_h(x) = \frac{h(x) g'(h(x)) \cdot h'(x)}{g(h(x))} \cdot \frac{x h'(x)}{h(x)}$$
$$= \frac{2\pi x(-\sin(2\pi x))}{\cos(2\pi x)} \cdot \frac{x(2\pi)}{2\pi x} =$$
$$= -2\pi x \sin(2\pi x) = \left| 2\pi x \tan(2\pi x) \right|$$

Verifikation \Rightarrow

$$K_f(x) = \frac{x(-\sin(2\pi x)) \cdot 2\pi}{\cos(2\pi x)} = \left| 2\pi x \tan(2\pi x) \right| \checkmark$$