(1) Suppose that $F(x), G(x), f(x)$ and $g(x)$ are functions which are differentiable everywhere and that $F''(x) = f(x)$ and $G'(x) = g(x)$. Compute the following.

a.) $\frac{d}{dx} [F(x) + G(x)] = f(x) + g(x)$

b.) $\frac{d}{dx} [3F(x)] = 3f(x)$

c.) $\frac{d}{dx} [F(x) - G(x)] = f(x) - g(x)$

d.) $\frac{d}{dx} [F(x) \cdot G(x)] = f(x)G(x) + g(x)F(x)$

e.) $\frac{d}{dx} [\frac{F(x)}{G(x)}] = \frac{f(x)G(x) - g(x)F(x)}{(G(x))^2}$

(2) Compute $\frac{d}{dx} [x^{100} \cos(x)]$

\[ = \frac{d}{dx} (x^{100}) \cos(x) + \frac{d}{dx} (\cos(x)) x^{100} \]

\[ = 100x^{99} \cos(x) - \sin(x) x^{100} \]

\[ = 100x^{99} \cos(x) - x^{100} \sin(x) \]