1. (14 pts.) Suppose that f and its derivative f' are continuous functions such that $f(0) = -1$, $f(2) = 3$, $f'(0) = 3$, $f'(2) = 4$, and $\int_0^2 f(x)\,dx = 1.5$. Compute each of the following definite or indefinite integrals. Be sure to show your work.

(a) $\int f'(x)e^{2f(x)}\,dx$

$= \frac{1}{2}e^{2f(x)} + C$

because $\frac{d}{dx}\{\frac{1}{2}e^{2f(x)} + C\} = \frac{1}{2}e^{2f(x)} \cdot 2f'(x)$ **by the chain rule.**

(b) $\int_0^1 f(2x)\,dx$

$= \int_0^2 f(w)\,\frac{dw}{2}$ **by** $w = 2x$**,** $dw = 2dx$**,** $x = 0, x = 1 \implies w = 0, w = 2$

$= \frac{1}{2}\int_0^2 f(w)\,dw = \frac{1.5}{2} = 0.75$

(c) $\int_0^2 xf''(x)\,dx$

$= xf'(x)|_0^2 - \int_0^2 f'(x)\,dx$ **using** $u = x, du = dx, dv = f''(x)dx, v = f'(x)$

$= 2 \cdot 4 - 0 - 3 + (-1) = 8 - 4 = 4$