Error function with dummy variable t

$$\frac{2}{\sqrt{\pi}}\int_0^x e^{-t^2}\,dt = \frac{2}{\sqrt{\pi}}\int_0^x \sum\nolimits_{k=0} \frac{(-t^2)^k}{k!}\,dt = \frac{2}{\sqrt{\pi}}\sum\nolimits_{k=0} \frac{(-1)^k}{k!}\int_0^x t^{2k}\,dt = \frac{2}{\sqrt{\pi}}\sum\nolimits_{k=0} \frac{(-1)^k x^{2k+1}}{k!\,(2k+1)}$$

Recall that CDF for normal distribution is $\frac{1}{2}\left[1+erf\left(\frac{x-\mu}{\sigma\sqrt{2}}\right)\right]$

Substitute the following into CDF:

$$t = \frac{x-\mu}{\sigma\sqrt{2}}, dt = \frac{dx}{\sigma\sqrt{2}}$$

$$\frac{1}{2}\left[1+erf\left(\frac{x-\mu}{\sigma\sqrt{2}}\right)\right] = \frac{1}{2}\left[1+\frac{2}{\sqrt{\pi}}\int_0^x e^{-\frac{(x-\mu)^2}{2\sigma^2}}\frac{dx}{\sigma\sqrt{2}}\right] = \frac{1}{2}+\frac{1}{\sigma\sqrt{2\pi}}\int_0^x e^{-\frac{(x-\mu)^2}{2\sigma^2}}\,dx = \frac{1}{\sigma\sqrt{2\pi}}\int_{-\infty}^x e^{-\frac{(x-\mu)^2}{2\sigma^2}}\,dx$$