i) $$erf^2(x) = \frac{4}{\pi}\iint_0^{x^2} e^{-(u^2+v^2)}\,du\,dv$$

$$= \frac{1}{\pi}\iint_{-x^2}^{x^2} e^{-(u^2+v^2)}\,du\,dv$$

$$erf^2(x) \geq 1 - e^{-x^2}$$

$x \to \infty$

$$erf^2(x) \geq 1 - \frac{1}{e^{x^2}} \doteq 1$$

ii) $$F_x(x) = \int_{-\infty}^{x} \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{(t-\mu)^2}{2\sigma^2}}\,dt$$

$$= \int_{-\infty}^{0} \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{(t-\mu)^2}{2\sigma^2}}\,dt + \int_0^x \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{(t-\mu)^2}{2\sigma^2}}\,dt$$

$$\frac{t-\mu}{\sigma\sqrt{2}} = y, \quad \frac{1}{\sigma\sqrt{2}}dt = dy$$

$$= \frac{1}{2} + \frac{1}{\sqrt{\pi}} \int_0^{\frac{x-\mu}{\sigma\sqrt{2}}} e^{-y^2}\,dy$$

$$= \frac{1}{2} + \frac{1}{2}\frac{1}{\sqrt{\pi}} \int_0^{\frac{x-\mu}{\sigma\sqrt{2}}} e^{-y^2}\,dy$$

$$= \frac{1}{2} + \frac{1}{2} erf\left(\frac{x-\mu}{\sigma\sqrt{2}}\right) = \frac{1}{2}\left(1 + erf\left(\frac{x-\mu}{\sigma\sqrt{2}}\right)\right)$$