QUIZ 9 : NINA CHALGERI

① Fermat

② Victor Poncelet ; "Traité des propriétés projectives des figures" → new form of geometry w/ cross ratios, projectivity, involution, circular points at infinity

③ Small town mayor

④ Balzac

⑤

(a) $= \sqrt{2\pi}$

(b) $c = \int_{-\infty}^{\infty} e^{\frac{-x^2}{2}} dx = \int_{-\infty}^{\infty} e^{-y^2/2} dy$ (x can be replaced w/ y) dummy

So $c^2 = \left(\int_{-\infty}^{\infty} e^{-x^2/2} dx \right) \left(\int_{-\infty}^{\infty} e^{y^2/2} dy \right)$

$= \int_{-\infty}^{\infty} \int_{-\infty}^{\infty} e^{-(x^2+y^2)/2} dx\, dy$

⇒ POLAR

$$c^2 = \int_0^{\infty} \int_0^{2\pi} r e^{-r^2/2} d\theta\, dr = 2\pi \int_0^{\infty} r e^{r^2/2} dr$$

$$\frac{d}{dr}\left(e^{-r^2/2}\right) = r e^{-r/2} \Rightarrow \int r e^{-r^2/2} = -e^{-r^2/2} + C$$

$$\Rightarrow \int_0^{\infty} r e^{-r^2/2} d\theta\, dr = -e^{r^2/2} \Big|_0^{\infty} = -e^{-\infty} - e^0 = 1$$

$$c^2 = 2\pi$$

$$\Rightarrow \sqrt{2\pi}$$