Q9

1. (2 points) What is the name of the French mathematician who did fundamental work in Number Theory independently, and at the same time, as Gauss, and what is the name of the innovative Geomery textbook that he wrote, that broke away from Euclid?

- Adrian Marie Legendre. Elements de geometrie

2. (2 points) Who was the most original pupil of Gaspard Monge, and what is the name of the book that he wrote? What does it contain?

- Charles Dupin. Traite des proprietes projectives des figures. Talks about new form of geometry, such as cross ratio, perspectivity, and projectivity

3. (1 point) What was the position of Evariste Galois's father?

- Mayor

4. (1 point) What is the name of the famous French author that shared Cauchy's conservative political views, as well his capacity for an infinite amount of work?

5. (4 points total) (a) (1 point) What is

$$\int_{-\infty}^{\infty} e^{-x^2/2}\, dx \quad ?$$

(b) (3 points) Prove it!

a) sqrt(2pi)

b)

$$\left(\int_{-\infty}^{\infty} e^{-\frac{x^2}{2}}\, dx \right)^2 = \int_{-\infty}^{\infty} e^{-x^2/2}\, dx \int_{-\infty}^{\infty} e^{-y^2/2}\, dy = \int\int_{-\infty}^{\infty} e^{-\frac{1}{2}(x^2+y^2)}\, dx\, dy =$$

$$= \int_{0}^{2\pi}\int_{0}^{\infty} re^{-\frac{1}{2}r^2}\, dr\, d\theta = -2\pi e^{-\frac{1}{2}r^2}\Big|_{0}^{\infty} = \boxed{2\pi}$$

→ Thus, integral = $\boxed{\sqrt{2\pi}}$