

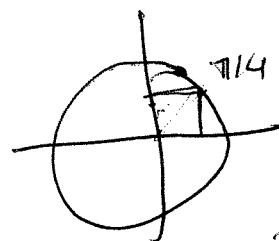
Moyenne (réponses du dernier DGD sur web)

⑤

$$(6) \frac{1}{1} \int_0^1 \frac{x dx}{x^2 + 2x + 5} \quad \uparrow \quad \int_1^2 \frac{x dx}{(x+1)^2 + 4} \quad \text{par subs. } \begin{matrix} u = x+1 & u_0 = 1 \\ du = dx & u_2 = 2 \end{matrix}$$

complexeur carré: $(x^2 + 2x + 1) + 4 = \cancel{1} + 5 = \cancel{1} + 4 = (x+1)^2 + 4$

$$= \int_1^2 \frac{u-1}{u^2+4} du = \int_1^2 \frac{u du}{u^2+4} - \int_1^2 \frac{1 du}{u^2+4}$$



$$y = u^2 + 4, \quad y_1 = 5, \quad y_2 = 8$$

$$dy = 2u du$$

$$= \frac{1}{2} \int_5^8 \frac{dy}{y} - \frac{1}{2} \arctan\left(\frac{u}{2}\right) \Big|_1^2 = \frac{1}{2} (\ln 8 - \ln 5) - \frac{1}{2} \arctan(1) + \frac{1}{2} \arctan(1/2)$$

$$= \frac{1}{2} \ln\left(\frac{8}{5}\right) - \frac{\pi}{8} \dots ?$$

$$7) \frac{1}{2\pi} \int_0^{2\pi} \sin^2 x \cos^2 x dx$$

$$\sin(x)\cos(x) = \frac{1}{2} \sin 2x$$

$$\frac{1}{2\pi} \int_0^{2\pi} (\sin(x)\cos(x))^2 dx = \frac{1}{8\pi} \int_0^{2\pi} \sin^2 2x dx$$

identité: $\sin^2 x = \frac{1}{2} (1 - \cos 2x)$

$$= \frac{1}{16\pi} \int_0^{2\pi} (1 - \cos 4x) dx$$

$$= \frac{1}{16\pi} \left[x - \frac{1}{4} \sin(4x) \right]_0^{2\pi}$$

$$= \frac{1}{8} - \frac{1}{64\pi} (0 - 0)$$

$$= \frac{1}{8}$$