$$\mathbb{E}\left[Z_y^k \cdot \mathbb{I}\left[\|Z\| > u^{1/2}\eta \right] \right]$$

$$\int_{x^2+y^2 > u} x\, e^{-(x^2+y^2)}\, dx\, dy$$

$$= \boxed{\int x e^{-x^2} dx} \boxed{\int e^{-y^2} dy}$$

discuss this issue with Dan!

$x^2+y^2 \geq$ [illegible] $y^2 - x^2$

$\leq x^2 + y^2$

$$= \int x e^{-x^2}$$

$$\leq \boxed{\int_{x \leq \cancel{\ldots}} x} \; \boxed{\int_{y^2 \geq \cancel{\ldots}\, x^2\, u^{1/2}\eta}}$$

≤ 1

$(0(e^{-}))$

change of var s.t. the elements are independent

$$\boxed{\begin{array}{l} \mathrm{cov}(Z) = A \\ \mathrm{cov}(A^{-1/2} Z) = I \end{array}}$$

$x^2 + y^2 > u^{1/2}\eta$ or x

$\Leftrightarrow y^2 > u^{1/2}\eta - x^2$

$\mathbb{I}[x^2 < u^{1/2}\eta/2]$, $\mathbb{I}[x^2 > u^{1/2}\eta/2]$. integrate over.

$\Downarrow$ $\qquad\qquad$ $\Downarrow$ $\qquad$ i.e. all y.

$y^2 > u^{1/2}\eta/2$ $\qquad$ $y^2 > 0$, $x^2 > u^{1/2}\eta/2$.