Calculus 112550015 資工一 劉家琪

Sec 15.3

50.

$$\int_{-\infty}^{\infty}\int_{-\infty}^{\infty} e^{-(x^2+y^2)}\,dA$$

$$= \lim_{a\to\infty} \iint_{D_a} e^{-(x^2+y^2)}\,dA$$

$$= \lim_{a\to\infty} \int_0^{\pi}\int_0^{a} e^{-r^2}\cdot r\,dr\,d\theta$$

$$= \lim_{a\to\infty} \int_0^{\pi}\int_0^{a} \frac{r}{e^{r^2}}\,dr\,d\theta$$

$$= \lim_{a\to\infty} \int_0^{\pi} d\theta \cdot \frac{-1}{2}\int_0^{-a^2} e^{u}\,du$$

$$= \lim_{a\to\infty} \pi \cdot -1\left[e^{-a^2}-1\right]$$

$$= \lim_{a\to\infty} \pi\left[1-\frac{1}{e^{a^2}}\right]$$

$$= \pi \#$$