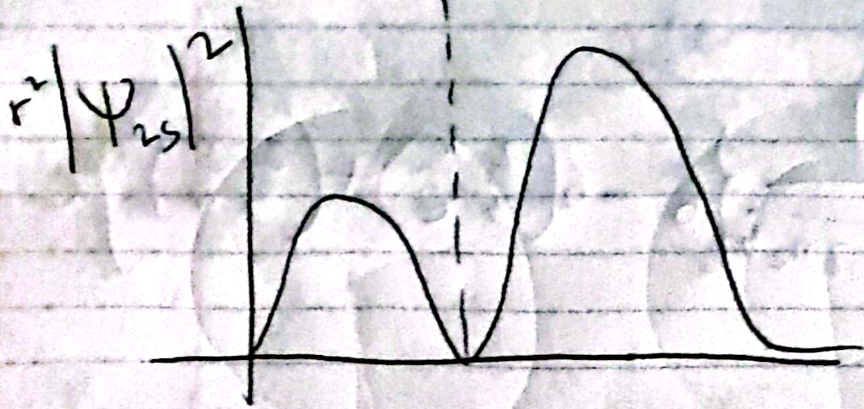
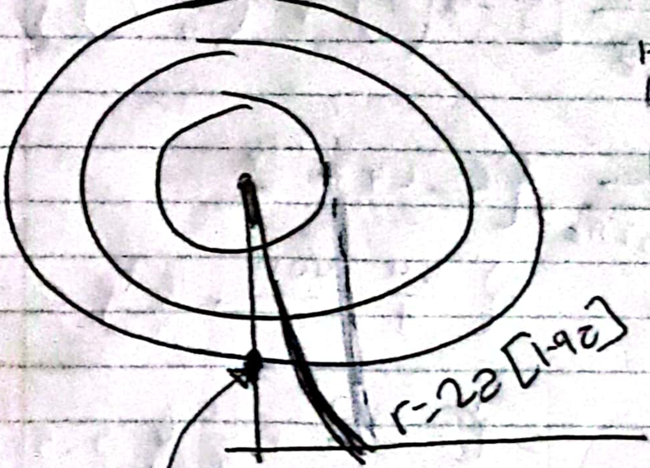


3s orbital

$$|\Psi_{3s}| = \frac{1}{\sqrt{162\pi z^3}}\left\{6 - 6\left(\frac{2}{3}\frac{r}{z}\right) + \left(\frac{2}{3}\frac{r}{z}\right)^2\right\} e^{-r/3z}$$

will be small but remains positive

When r increases but still less than z (*) value still remains small and less than 6



at r = 0

$$|\Psi_{3s}| = \frac{1}{\sqrt{162\pi z^3}}\left\{6 - 6\left(\frac{2}{3}\frac{r}{z}\right) + \left(\frac{2}{3}\frac{r}{z}\right)^2\right\} e^{-r/3z}$$

r = 0

$$= \frac{1}{\sqrt{162\pi z^3}}\left\{6 - 6\left(\frac{2}{3}(0)\right) + \left(\frac{2}{3}(0)\right)^2\right\} e^{0}$$

$$= \frac{6}{\sqrt{162\pi z^3}}$$

$$\begin{array}{r} 387 \\ -229 \end{array} \qquad \begin{array}{r} 16 \\ 387 \\ \hline 229 \end{array} \qquad \begin{array}{r} 490 \\ 49 \\ \hline 141 \end{array}$$

$r \approx 2a$ $[1.92]$

$$\begin{array}{r} 387 \\ 16 \end{array}$$

$$|\psi_{33}| = |\psi_{300}| = \frac{1}{\sqrt{162\pi a^3}}\left\{6 - 6\left(\frac{2}{3}\frac{r}{a}\right) + \left(\frac{2}{3}\frac{r}{a}\right)^2\right\} e^{-r/(3a)}$$

$$= \frac{1}{\sqrt{162\pi a^3}}\left\{6 - 6\left(\frac{2}{3}\cancel{2}\right) + \left(\frac{2}{3}(2)\right)^2\right\} e^{-2/3}$$

$$= \frac{1}{\sqrt{162\pi a^3}}\left\{6 - 6(8) + \left(\frac{16}{9}\right)\right\} 0.513$$

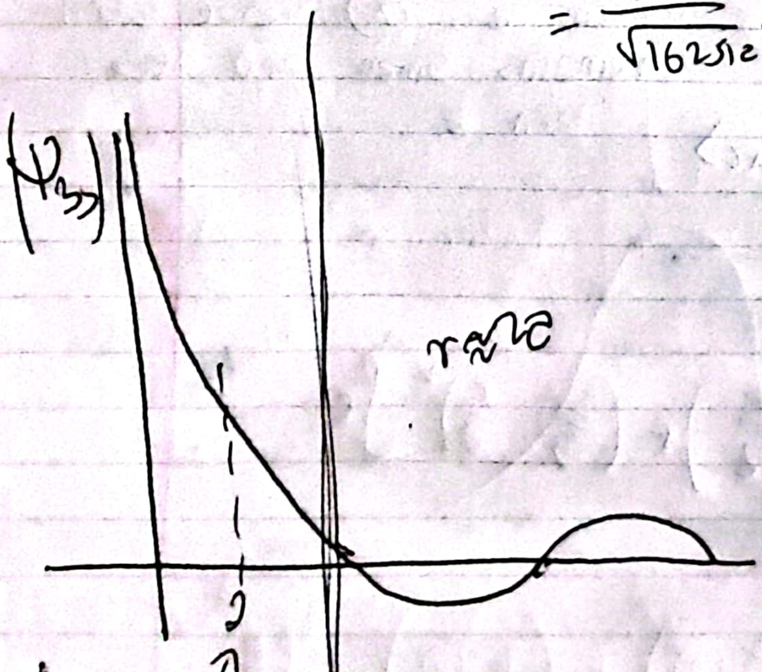
$$= \frac{1}{\sqrt{162\pi a^3}}\left\{6 - 49 + \frac{16}{9}\right.$$

$$\left\{\frac{54}{9} - \frac{441}{9} + \frac{16}{9}\right\} 0.513$$

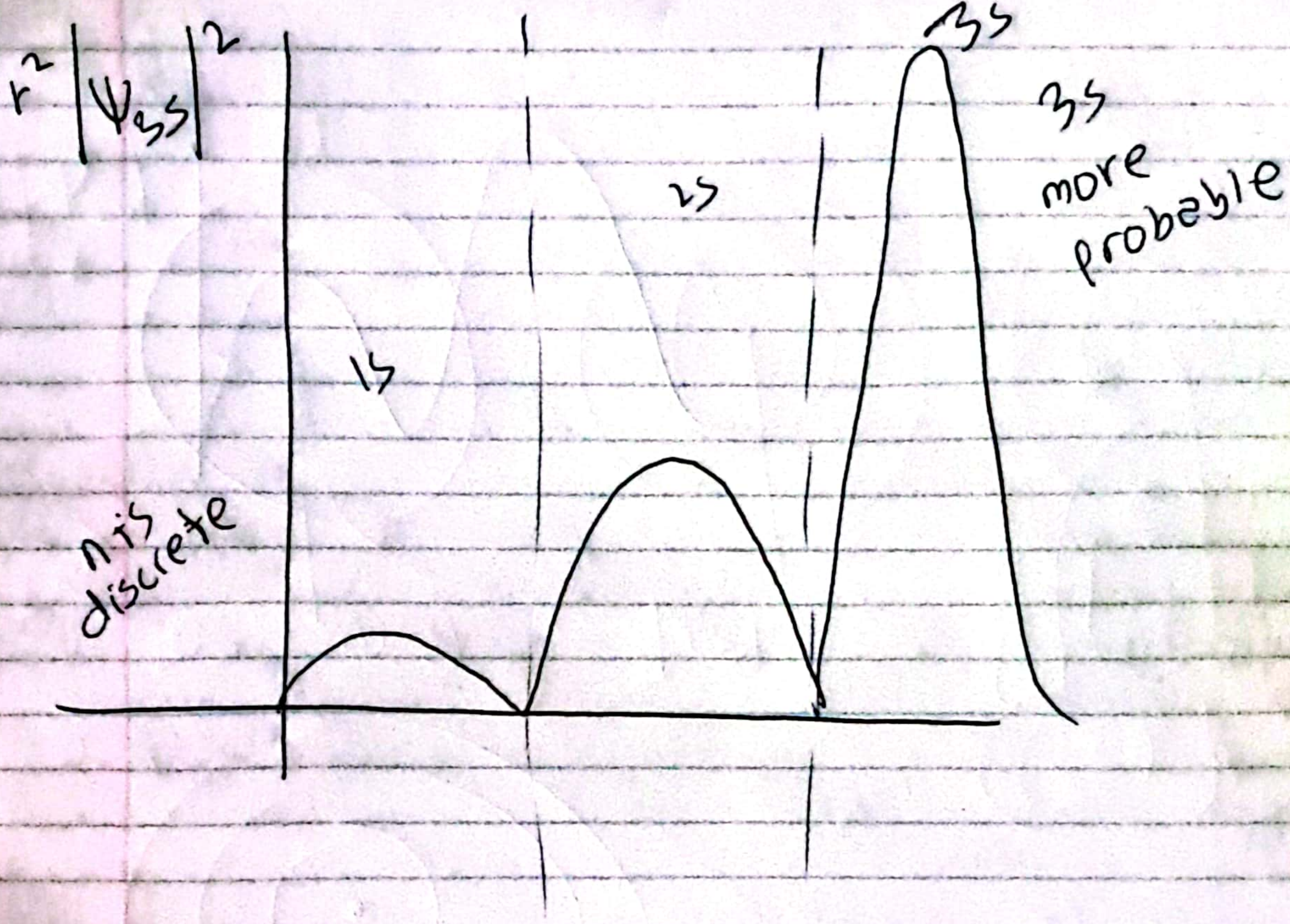
$$= \left\{-\frac{387}{9} + \frac{16}{9}\right\} 0.513$$

$$= \left\{\frac{-379}{9}\right\} 0.513$$

$$= -\frac{21.147}{\sqrt{162\pi a^3}}$$



decrease so a decaying function


$r^2|\psi_{3s}|^2$
1s
2s
3s
3s
more
probable
n is
discrete