2018P4Q8

CHANCE OF 1 STAR HAVING MASS $25M_\odot$ OR MORE:

$$P(25M_\odot+) = \frac{\int_{25}^{\infty} m^{-1.35}\,dm}{\int_{0.1}^{\infty} m^{-1.35}\,dm}$$

$$= \frac{\frac{1}{-1.35}\left[m^{-2.35}\right]_{25}^{\infty}}{\frac{1}{-1.35}\left[m^{-2.35}\right]_{0.1}^{\infty}} = \frac{-25^{-2.35}}{-0.1^{2.35}} = 2.3\cdot10^{-6}$$

CHANCE OF 1 STAR HAVING LESS MASS THAN $25M_\odot = 1 - 2.3\cdot10^{-6}$

CHANCE OF N STARS NOT CONTAINING ONE WITH A MASS MORE THAN $25M_\odot =$

$$\left[1 - P(25M_\odot+)\right]^N$$

50% PROBAB. FOR AT LEAST 1 OF A $25M_\odot+$ STAR $\Leftrightarrow$ 50% PROBAB FOR NOT CONTAINING IT.

$$0.5 = \left(1 - P(25M_\odot+)\right)^N$$

$$N = \log_{1-P(25M_\odot+)} 0.5 \qquad 0.5 = \log_{1-2.3\cdot10^{-6}} 0.5 = 3\cdot10^5$$

SECOND PARAGRAPH:

WHAT FRACTION OF CLUSTERS HAVE AT LEAST $3 \cdot 10^5$ STARS?

~~FRACTION~~ ~~FRACTION OF THOSE~~ WHICH CONTAIN $3 \cdot 10^5$ STARS

$$\text{FRACTION} = \frac{1}{\int_{50}^{\infty} N^{-2} dN} \int_{3 \cdot 10^5}^{\infty} N^{-2} dN$$

NORMALIZATION TERM

$$= \frac{1}{\left[-N^{-1}\right]_{50}^{\infty}} \left[-N^{-1}\right]_{3 \cdot 10^5}^{\infty} = 50 \, \frac{1}{3 \cdot 10^5} = 1.67 \cdot 10^{-4}$$