Untitled

xj2249

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Let X denote the number of people who develop uveal melanoma in a given year. Since n is very large and p is small, X follows a poisson distribution as followed:

$$X \sim Poi(42.5), \quad \lambda = 42.5$$

Therefore

$$P(X = 30) = \frac{\lambda^x e^{-\lambda}}{x!} = \frac{42.5^{30} e^{-42.5}}{30!} = 0.0093431 \approx 0.009$$

b)

The population of Asians, non-Hispanic Whites and Black are 1.19×10^6, 3.638×10^6, 2.0655×10^8, and therefore, X_{Asians},$X_{non-HispanicWhites}$ and X_{Black} separately follow poisson distributions as followed:

$$X_{Asians} \sim Poi(0.464)$$
$$X_{non-HispanicWhites} \sim Poi(21.901)$$
$$X_{Black} \sim Poi(0.640))$$

Therefore

$$P(X_{Asians} = 30) = \frac{\lambda^x e^{-\lambda}}{x!} = \frac{0.464^{30} e^{0.464}}{30!} = 2.346209 \times 10^{-43} \approx 2.346 \times 10^{-43}$$

$$P(X_{non-HispanicWhites} = 30) = \frac{\lambda^x e^{-\lambda}}{x!} = \frac{21.901^{30} e^{21.901}}{30!} = 0.0190009 \approx 0.019$$

$$P(X_{Black} = 30) = \frac{\lambda^x e^{-\lambda}}{x!} = \frac{64.031^{30} e^{64.031}}{30!} = 3.0464263 \times 10^{-39} \approx 3.046 \times 10^{-39}$$