The box contains 14 green and 19 black pencils. Pencils are picked up randomly one by one without replacement. What is the probability that 2 black and 3 green pencils are picked up in first five pickups?

Solution

$$P(2\ black\ and\ 3\ green\ pencils) =$$
$$= P(BBGGG) + P(BGBGG) + P(BGGBG) + P(BGGGB) + P(GBBGG) +$$

$$+ P(GBGBG) + +P(GBGGB) + P(GGBBG) + P(GGBGB) + P(GGGBB) =$$

$$= \frac{19}{33} \cdot \frac{18}{32} \cdot \frac{14}{31} \cdot \frac{13}{30} \cdot \frac{12}{29} + \frac{19}{33} \cdot \frac{14}{32} \cdot \frac{18}{31} \cdot \frac{13}{30} \cdot \frac{12}{29} + \frac{19}{33} \cdot \frac{14}{32} \cdot \frac{13}{31} \cdot \frac{18}{30} \cdot \frac{12}{29} + \frac{19}{33} \cdot \frac{14}{32} \cdot \frac{13}{31} \cdot \frac{12}{30} \cdot \frac{18}{29} + \frac{14}{33}$$
$$\cdot \frac{19}{32} \cdot \frac{18}{31} \cdot \frac{13}{30} \cdot \frac{12}{29} + \frac{14}{33} \cdot \frac{19}{32} \cdot \frac{13}{31} \cdot \frac{18}{30} \cdot \frac{12}{29} + \frac{14}{33} \cdot \frac{19}{32} \cdot \frac{13}{31} \cdot \frac{12}{30} \cdot \frac{18}{29} + \frac{14}{33} \cdot \frac{13}{32} \cdot \frac{19}{31} \cdot \frac{18}{30} \cdot \frac{12}{29}$$
$$+ \frac{14}{33} \cdot \frac{13}{32} \cdot \frac{19}{31} \cdot \frac{12}{30} \cdot \frac{18}{29} + \frac{14}{33} \cdot \frac{13}{32} \cdot \frac{12}{31} \cdot \frac{19}{30} \cdot \frac{18}{29} = \frac{10 \cdot 19 \cdot 18 \cdot 14 \cdot 13 \cdot 12}{33 \cdot 32 \cdot 31 \cdot 30 \cdot 29} = 0.262$$

Answer: 0.262.