# Probability questions

**1.a)** $p(identical\ twin/\ twin) = \frac{p(identical \cap twin)}{p(twin)} = \frac{\frac{5}{17}}{\frac{5}{17} + \frac{1}{2} * \frac{12}{17}} = \frac{5}{11}$

**1.b)** $p(bowl\ 1/\ chocolate) = \frac{p(bowl\ 1 \cap chocolate)}{p(chocolate)} = \frac{\frac{3}{8}}{\frac{5}{8}} = \frac{3}{5} = 0.6$

**2)**

$p((yellow \cap 1994)/\ 1\ yellow\ and\ 1\ green) = \frac{p((yellow \cap 1994) \cap (\ 1\ yellow\ and\ 1\ green))}{p(1\ yellow\ and\ 1\ green)} =$

$= \frac{\frac{1}{2} * \frac{2}{10} + \frac{1}{2} * \frac{2}{10}}{\frac{1}{2} * \frac{1}{10} + \frac{1}{2} * \frac{2}{10} + \frac{1}{2} * \frac{2}{10} + \frac{1}{2} * \frac{14}{100}} = \frac{5}{8} = 0.625$

**3.a)** $p(swine\ flu/\ positive) = \frac{p(swine\ flu \cap positive)}{p(positive)} = \frac{\frac{1}{10^4} * 0.99}{\frac{1}{10^4} * 0.99 + \frac{9999}{10^4} * 0.01} = \frac{1}{102}$

**3.b)**

$p(swine\ flu/\ positive\ after\ thailand) = \frac{p(swine\ flu \cap positive\ after\ thailand)}{p(positive\ after\ thailand)} = \frac{\frac{1}{200} * 0.99}{\frac{1}{200} * 0.99 + \frac{199}{200} * 0.01} = \frac{99}{298}$

**4)** is the same question as 1.a

# Questions about random variables

**1)**

| $X$ | $+\ 6\$$ | $-\ 3\$$ |
|---|---|---|
| $P(X)$ | $\frac{1}{3}$ | $\frac{2}{3}$ |

$E(X) = 6 * \frac{1}{3} - 3 * \frac{2}{3} = 0\$$

**2)**

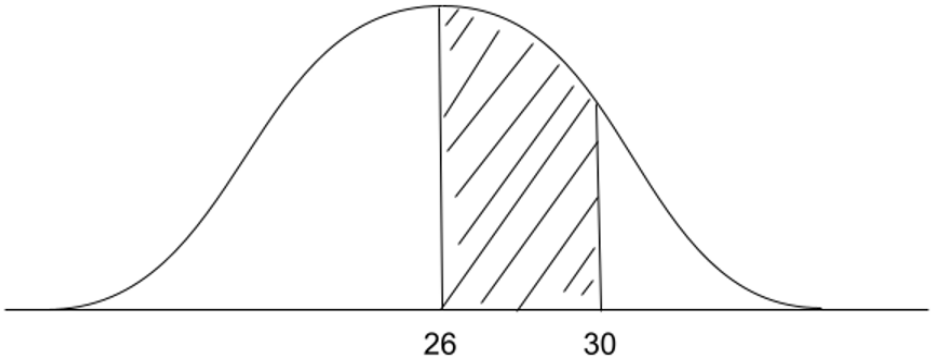
| $X$ | $+\ 5\$$ | $0$ | $-\ 6\$$ |
|---|---|---|---|
| $P(X)$ | $\frac{6}{25}$ | $\frac{4}{25}$ | $\frac{15}{25}$ |

$E(X) = 5 * \frac{6}{25} + 0 * \frac{4}{25} - 6 * \frac{15}{25} = -1.68\$$

**3)** $mean = \bar{x} = 8 * 0.4 = 3.2$

$Standard\ deviation = \sqrt{np(1-p)} = \sqrt{8 * 0.4 * 0.6} = 1.38 \approx 1.4$

**4)** $\bar{x} = 26,\ \sigma = 2$




$p(26 < x < 30) = p(x < 30) - p(x < 26) = 0.97725 - 0.5 = 0.47725$

**5)** $p(x > 3) = \frac{2*0.4}{2} = 0.4$

**6)** $p(3\ of\ 4\ have\ children) = \binom{4}{3} * (0.6)^3 * (0.4) = 0.3456$

**7)**

| $X$ | -10 | -5 | 0 | 5 | 10 |
|---|---|---|---|---|---|
| $P(X)$ | 0.1 | 0.35 | 0.1 | 0.35 | 0.1 |

$E(X) = (-10) * 0.1 - 5 * 0.35 + 0 * 0.1 + 5 * 0.35 + 10 * 0.1 = 0$