

1. Basic counting rule

12 choices for gold, 11 choices for silver and 10 for bronze

$$12 \cdot 11 \cdot 10 = 1320$$

$$= \frac{1320}{3} = 220 \text{ ways}$$

2a) $= \frac{15}{50} * \frac{15}{198}$

$$= \frac{5}{176}$$

b) $= \frac{15}{198} * \frac{68}{198} * \frac{15}{20} * \frac{68}{80}$

$$= 0.0165863$$

$$= 1.658$$

3. Since zero can't be the first digit, it could be the second or third

$$\text{Thus slots} = 9 \cdot 10 \cdot 10$$

Since z can't be the last of the three letters, it could be the first or second

$$\text{Thus slots} = 26 \cdot 26 \cdot 25$$

$$\text{" , " total possibilities} = 9 \cdot 10 \cdot 10 \cdot 26 \cdot 26 \cdot 25 = 12960000$$

4a) possibilities

$$= 2^4$$

$$= 16$$

b.) At least 1 head

$$= \left(\frac{1}{16} * \frac{1}{16} * \frac{1}{16} * \frac{1}{16} \right) 15$$

$$= \frac{15}{65536}$$

$$= 0.0002288$$

$$= 0.02288$$

5.

$$\text{Mean} = 6$$

$$\text{Standard deviation} = 0.5$$

a).

$$\begin{aligned}P(X \geq 7.5) &= P\left(z \geq \frac{7.5-6}{0.5}\right) \\&= P(z \geq 3) \\&= P(z \leq -3) = 0.0044 \\&= 0.44\end{aligned}$$

b).

$$\begin{aligned}P(5.5 \leq X \leq 6.5) &= P\left(\frac{5.5-6}{0.5} \leq z \leq \frac{6.5-6}{0.5}\right) \\&= P(-1 \leq z \leq 1) \\&= 0.8413 - 0.2420 = 0.5993 \\&= 59.93\end{aligned}$$

c).

$$\begin{aligned}P(X \leq 6.7) &= P\left(z \leq \frac{6.7-6}{0.5}\right) \\&= P(z \leq 1.4) = 0.9192 \\&= 91.92\end{aligned}$$

6.

$$A = A_0 * 2^{-t/h}$$

$$A_0 = 10 \text{ kg}, t = 100 \text{ years}, h = 304 \text{ years}$$

$$A = 10 * 2^{-\frac{100}{304}}$$

$$A = 8.0 \text{ kg}$$

7.

$$\text{Doubling time} = 70/4 = 17.5$$

$$p = p_0 * 2^{\frac{t}{t-double}}$$

$$= 842,364 * 2^{\frac{4}{17.5}} = 986,976$$

Population after 4 years = 986,976

8.

Growth rate = 9650/560000

$$p = p_0(1 \pm r)^t$$

$$= 560000 \left(1 + \left(\frac{9650}{560000} \right) \right)^{15}$$

$$= 723,584$$

9.

$$A = p_0 \left(1 + \frac{r}{n} \right)^{t*n}$$

$$= 500(1 + 0.04/4)^{(10 * 4)}$$

$$= 744$$

10.

$$F = PMT \left[\frac{\left(1 + \frac{r}{n} \right)^{nt} - 1}{\frac{r}{n}} \right]$$

$$2000000 = PMT \left[\frac{\left(1 + \frac{0.06}{12} \right)^{40*12} - 1}{\frac{0.06}{12}} \right]$$

$$PMT = 1004.27$$

Monthly deposit = 1001.27

11.

$$\begin{aligned} A &= p_0(1 + APR * y) \\ &= 1000(1 + 0.06 * 18) \\ &= 2,080.00 \end{aligned}$$

12.

a).

$$\begin{aligned} F &= PMT \left[\frac{\left(1 + \frac{r}{n}\right)^{nt} - 1}{\frac{r}{n}} \right] \\ &= 200 \left[\frac{\left(1 + \frac{0.05}{12}\right)^{10*12} - 1}{\frac{0.05}{12}} \right] = 31,056.46 \end{aligned}$$

Amount in the account after 10 years = 31,056.46

b).

Amount deposited = $200 * 12 * 10 = 24,000.00$

c).

$$\begin{aligned} \text{Interest} &= \text{total amount} - \text{amount deposited} \\ &= 31,056.46 - 24,000 \\ &= 7,056.46 \end{aligned}$$

13.

Standard deduction = 12,200, exemption per person = 3,900

Thus they should standard deduction since it is greater than the itemized deduction.

$$\text{Gross income} = 83300 + 1650 = 84,940$$

$$\text{AGI} = \text{gross income} - \text{adjustments}$$

$$= 84,940 - 3240 = 81,700$$

$$\text{Taxable income} = 81,700 - 12,200 - 4 \times 3,900 = 53,900.00$$

14.

$$\text{Taxable income} = 85,000$$

Tax calculation:

$$\text{Up to 8,925: } \frac{10}{100} (8925) = 892.5$$

$$8925 \text{ to } 36,250: \frac{15}{100} (27,325) = 4,098.75$$

$$36,251 \text{ to } 87,850: \frac{25}{100} (48,750) = 12,187.5$$

$$\text{Total tax owed} = 892.5 + 4,098.75 + 12,187.5 = 17,178.75$$

15.

a)

$$PMT = 100,000 * \left[\frac{\frac{0.073}{12}}{1 - \left(1 + \frac{0.073}{12}\right)^{-30 \times 12}} \right] = 685.57$$

The monthly payment for a 30-year loan at 7.3% interest is 685.57

b).

$$A = \frac{685.57 \left(1 + \frac{0.073}{12}\right)^{30 \cdot 12} - 1}{\frac{0.073}{12}} = 1,000,143.85$$

The total amount for a 30-year loan at 7.3% interest is 1,000,143.85

c).

$$PMT = 100,000 * \left[\frac{\frac{0.068}{12}}{1 - \left(1 + \frac{0.068}{12}\right)^{-15 \cdot 12}} \right] = 887.68$$

The monthly payment for a 15-year loan at 6.8% interest is 887.68

17.

11, 17, 18, 23, 25, 26, 26, 31, 31, 33, 41, 44, 45, 48, 53

n = 15

a).

$$\text{Lower quartile} = \frac{15+1}{4} = 23.0$$

$$\text{Third quartile} = 3 \frac{15+1}{4} = 44.0$$

Median = 31.0

b).

$$\begin{aligned} \text{Mean} &= (11 + 17 + 18 + 23 + 25 + 26 + 26 + 31 + 31 + 33 + 41 + 44 + 45 + 48 + 53) / 15 \\ &= 31.5 \end{aligned}$$

Mode = 26.0, 31.0

