1) 
   
   a) 
   To get $200,000 from $25,000 there had to be 3 doubling periods. 
   So every 10 years the money must double.
   
   \[
   \frac{72}{x} = 10 
   \]
   
   \[x = \frac{72}{10} = 7.2 \%
   \]
   
   b) 
   Image 
   
   c) 
   This program adds each of the inputs plus an additional one and stops when you get an input of 0.
   
   So you get, 
   
   \[(7+1)+(3+1)+(2+1)+(1+(-4))+(1+1)+(1+3) = 18\]
   
2) 

   ```javascript
   var cels = 0;
   document.write("<br> Fahrenheit    Celsius");
   
   while (cels <= 100) {
       document.write("<br> " + cels + " " + (9 / 5 * cels + 32));
       cels = cels + 10;
   }
   ```
   
   b) 
   
   ```javascript
   i = 0
   heads = 0
   tails = 0
   
   while (i < 1000) {
       r = Math.random() // random number r >= 0, < 1.0
       if (r < 0.5) {
           tails = tails + 1
       } else {
           heads = heads + 1
   ```
i = i + 1

print "heads = ", heads, " tails = ", tails

3)

cheetah: $128 \times 10^6$ Bytes
sierra: $2 \times 10^9$ Bytes

15 years passed from 2001 to 2016 which is 10 doubling periods.

$(128 \times 10^6) \times 2^{10} = 1.3 \times 10^{11}$ Bytes

which is much larger than the current Sierra OS

b)

system 1: $128 \times 10^3$ Bytes

17 years passed from 1984 to 2001 so that's about 11 doubling periods.

$(128 \times 10^3) \times 2^{11} = 2.6 \times 10^8$ Bytes which is far higher than what happened.

32 years passed from 1984 to 2016 so that's 20 doubling periods

$(128 \times 10^3) \times 2^{20} = 1.3 \times 10^{11}$ Bytes which is still far too high

c)

i)

48% of $520$ million = 249.6 million

ii)

how much of a percent is $60$ million

1988:

$630 \times x = 60$

$x = 9.5\%$

1991:

$520 \times x = 60$

$x = 11.5\%$

so the sectors are Services, Manufacturing, and Other

iii)

Sectors that decreased are Manufacturing, Retail, Wholesale and Other.
The only ones that need to be compared are Manufacturing and Retail.

Manufacturing:

\[(0.31 \times 630) - (0.20 \times 520) = 91.3\]

Retail:

\[(0.19 \times 630) - (0.08 \times 520) = 78.1\]

Manufacturing reduced the most.

iv) 
1/4 went to Orchestras. \((1/2 \times 3/4) = 3/8\) went to television. 
\[3/8 - 2/8 = 1/8\]

\[1/8 \times (0.08 \times 520) = 5.2\text{ million}\]

d) 
1 day \times (24\text{ hours/1 day}) \times (60\text{ minutes/1 hour}) \times (60\text{ sec/1 min}) \times 10\text{Gb/s} \times (1\text{ B/8 b}) \times 200\text{ cables} \times (1\text{ PB/10^6 GB}) = 21.600000\text{ PB}

ii) 
One character is 1 byte, so say there are on average 200 pages in a book and there are 2000 characters on a page. That means you have 
\[200 \times 2000 = 4 \times 10^5\text{ bytes}\]

So if \(X\) is the number of books in the British Library 
\[X \times 4 \times 10^5 \times 192 = 21.6\text{ PB}\]

\[X = 21.6 \times 10^{15}\text{ Bytes} / (192 \times 4 \times 10^5)\]

\[X = 281,250,000\text{ books}\]