1)

$$\frac{B_{time}}{A_{time}} = 1 + \frac{n}{100}$$
$$\frac{40}{20} = 1 + \frac{n}{100}$$
$$100 = n$$

b is the correct answer

2)

$$\text{speedup} = \frac{1}{(1 - f_1 - f_2 \ldots - f_n) + \frac{f_1}{s_1} \ldots + \frac{f_n}{s_n}}$$
$$= \frac{1}{(1 - .35) + \frac{.35}{15}}$$
$$= 1.48$$

3)
  a)

$$\text{speedup} = \frac{1}{1 - .8 + \frac{.8}{20}}$$
$$= 4.16$$

  b)

$$\text{speedup} = \frac{1}{1 - .2 + \frac{.2}{80}}$$
$$= 1.24$$

  c)

$$\text{speedup} = \frac{1}{1 - .9 + \frac{.9}{10}}$$
$$= 5.26$$

  d)

$$\text{speedup} = \frac{1}{1 - .1 + \frac{.1}{90}}$$
$$= 1.1$$

the best option for improving the overall speedup of the program is option c.

4)

$$\text{module speedup} = 1 + \frac{\text{percent speedup of module}}{100}$$

a)

$$\text{speedup} = \frac{1}{1 - .8 + \frac{.8}{1+.2}}$$
$$= 1.15$$

b)

$$\text{speedup} = \frac{1}{1 - .2 + \frac{.2}{1+.8}}$$
$$= 1.09$$

c)

$$\text{speedup} = \frac{1}{1 - .9 + \frac{.9}{1+.1}}$$
$$= 1.08$$

d)

$$\text{speedup} = \frac{1}{1 - .1 + \frac{.1}{1+.9}}$$
$$= 1.04$$

a is the best option for overall speedup.

5)