1.6.

CPI for each class

	A	B	C	D	CR
P_1	1	2	3	3	2,5 GHz
P_2	2	2	2	2	3 GHz

$IC = 1 \cdot 10^6$ instructions

IC for each class

A	B	C	D
10%	20%	50%	20%
10^5	$2 \cdot 10^5$	$5 \cdot 10^5$	$2 \cdot 10^5$

b. $CC_1 = 1 \cdot 10^5 + 2 \cdot 2 \cdot 10^5 + 3 \cdot 5 \cdot 10^5 + 3 \cdot 2 \cdot 10^5 =$
$= 26 \cdot 10^5 = 2,6 \cdot 10^6$ clock cycles

$CC_2 = 2 \cdot 10^5 + 2 \cdot 2 \cdot 10^5 + 2 \cdot 5 \cdot 10^5 + 2 \cdot 2 \cdot 10^5 =$
$= 20 \cdot 10^5 = 2 \cdot 10^6$ clock cycles

a. $CPI_1 = \dfrac{CC_1}{IC} = \dfrac{2,6 \cdot 10^6}{1 \cdot 10^6} = 2,6$ clocks/instruction

$CPI_2 = \dfrac{CC_2}{IC} = \dfrac{2 \cdot 10^6}{1 \cdot 10^6} = 2$ clocks/instruction

1.7.

$IC_1 = 1 \cdot 10^9$

$CPU_{time_1} = 1,1 s$

$IC_2 = 1,2 \cdot 10^9$

$CPU_{time_2} = 1,5 s$

a. $CCT = 1 ns = 1 \cdot 10^{-9} s$

$CPU_{time} = IC \times CPI \times CCT \Rightarrow CPI = \dfrac{CPU_{time}}{IC \times CCT}$

$CPI_1 = \dfrac{1,1}{1 \cdot 10^9 \cdot 10^{-9}} = 1,1 \text{ clocks / instruction}$

$CPI_2 = \dfrac{1,5}{1,2 \cdot 10^9 \cdot 10^{-9}} = 1,25 \text{ clocks / instruction}$

b. $CPU_{time_1} = CPU_{time_2}$

$\Rightarrow IC_1 \times CPI_1 \times CCT_1 = IC_2 \times CPI_2 \times CCT_2 \left| \dfrac{1}{CC_1 \cdot IC_2 \cdot CPI_2} \right.$

$\dfrac{CCT_2}{CCT_1} = \dfrac{IC_1 \times CPI_1}{IC_2 \times CPI_2} = \dfrac{1 \cdot 10^9 \times CPI_1}{1,2 \cdot 10^9 \times CPI_2}$

$\dfrac{CCT_1}{CCT_2} = \dfrac{IC_2 \times CPI_2}{IC_1 \times CPI_1} = \dfrac{1,2 \cdot 10^9 \times CPI_2}{1 \cdot 10^9 \times CPI_1} =$

$= 1,2 \dfrac{CPI_2}{CPI_1}$

dacă presupunem
că $CPI_1 = CPI_2$

$\Rightarrow$ procesorul A merge
de 1,2 ori mai
repede decât B

c. $IC_3 = 6 \cdot 10^8$

$CPI_3 = 1,1 \text{ clocks / instr.}$

$CC_3 = IC_3 \times CPI_3 = 6 \cdot 10^8 \cdot 1,1 = 6,6 \cdot 10^8 \text{ clocks}$

$CC_1 = IC_1 \times CPI_1 = 10^9 \cdot 1,1 = 1,1 \cdot 10^9 \text{ clocks}$

$CC_2 = IC_2 \times CPI_2 = 1,2 \cdot 10^9 \cdot 1,25 = 1,5 \cdot 10^9 \text{ clocks}$

$$\frac{CC_3}{CC_2} = \frac{6,6 \cdot 10^8}{1,5 \cdot 10^9} = 0,44 \Rightarrow 56\% \text{ increase in speed}$$

$$\frac{CC_3}{CC_1} = \frac{6,6 \cdot 10^8}{1,1 \cdot 10^9} = 0,6 \Rightarrow 40\% \text{ increase in speed}$$