1.7

a. CPI = $T_{exec} \times f$/No. instr.

Compiler A CPI = 1.1

Compiler B CPI = 1.25

b. f_B/f_A = (No. instr.(B) × CPI(B))/(No. instr.(A) × CPI(A)) = 1.37

c. $T_A/T_{new} = 1.67$

$T_B/T_{new} = 2.27$

1.9

1.9.1

p	# arith inst.	# L/S inst.	# branch inst.	cycles	ex. time	speedup
1	2.56E9	1.28E9	2.56E8	7.94E10	39.7	1
2	1.83E9	9.14E8	2.56E8	5.67E10	28.3	1.4
4	9.12E8	4.57E8	2.56E8	2.83E10	14.2	2.8
8	4.57E8	2.29E8	2.56E8	1.42E10	7.10	5.6

1.9.2

p	ex. time
1	41.0
2	29.3
4	14.6
8	7.33

1.9.3 3

1.10

1.10.1 die area_{15cm} = wafer area/dies per wafer = $pi*7.5^2 / 84 = 2.10\ cm^2$

$\text{yield}_{15cm} = 1/(1+(0.020*2.10/2))^2 = 0.9593$

die area_{20cm} = wafer area/dies per wafer = $pi*10^2/100 = 3.14\ cm^2$

$\text{yield}_{20cm} = 1/(1+(0.031*3.14/2))^2 = 0.9093$

1.10.2 $\text{cost/die}_{15cm} = 12/(84*0.9593) = 0.1489$

$\text{cost/die}_{20cm} = 15/(100*0.9093) = 0.1650$

1.10.3 die area_{15cm} = wafer area/dies per wafer = $pi*7.5^2/(84*1.1) = 1.91\ cm^2$

$\text{yield}_{15cm} = 1/(1 + (0.020*1.15*1.91/2))^2 = 0.9575$

die area_{20cm} = wafer area/dies per wafer = $pi*10^2/(100*1.1) = 2.86\ cm^2$

$\text{yield}_{20cm} = 1/(1 + (0.03*1.15*2.86/2))^2 = 0.9082$

1.10.4 defects per $\text{area}_{0.92}$ = (1–y^.5)/(y^.5*die_area/2) = (1−0.92^.5)/(0.92^.5*2/2) = 0.043 defects/cm^2

defects per $\text{area}_{0.95}$ = (1–y^.5)/(y^.5*die_area/2) = (1−0.95^.5)/(0.95^.5*2/2) = 0.026 defects/cm^2