Merve Horuz
1801042651
CSE 331-503 Hw 0

1))

A.

wafer_x => wafer area = $\pi r^2 = 3.162 \times 8^2 = 201.088\ cm^2$

Dies per wafer ≈ wafer area / die area
64 ≈ 201.088 / die are => die area = 3.142

wafer_y => wafer area = $\pi . r^2 = 3.162 \times 10^2 = 316.2\ cm^2$
100 ≈ 316.2 / die area = 3.162

B.
wafer_x => $1 / (1 + (\text{defects per area} \times \text{die area} / 2))^2$
$1/(1+(0.02 \times 3.162/2))^2$ => yield = 1 / 1.084 = 0.94

cost per die = 15 / 64 x 0.94 = 0.2493

wafer_y => $1/(1+(0.03 \times 3.162/2))^2$ yield = 1/1.096 = 0.9124
cost per die = 24 / 100 x 0.9124 ≐ 0.26

C.
wafer_x => 15 . 20% = 3 => cost per wafer = 15 - 3 = 12
64 . 10% = 6.4 => dies per wafer = 70.4
0.02 . 15% = defects / cm² = 0.003 + 0.02 = 0,023

wafer_y => 24 . 20% = 4.8 => cost per wafer = 19.2
100 . 10% = 10 => dies per wafer = 110
0.03 . 15% = defects / cm² = 0,0045 = 0.0345

Then, wafer areas are same in A.
70.4 = 201.088 / die area => die area = 2.8563 for wafer_x
110 = 316.2 / die area => die area = 2.8563 for wafer_y

B
yield for wafer_x = $1/(1+(0.023 \times 2.8563/2))^2 = 0.9374$
cost per die for wafer_x = $12/70.6 \times 0.9374 = 0.1818$

yield for wafer_y = $1/(1+(0,0345 \times 2.8563/2))^2 = 0.9083$
cost per die for wafer_y = $19.2/110 \times 0,9083 = 0,1921$

* Cost per die is 0,2693 in wafer_x before year, so cost per die has decreased compared to previous year because of it is 0,1818 for this year.

* Cost per die is 0.26 in wafer_y previous year, so cost per die has decreased to 0,1921

2))

A.
$P1 \Rightarrow 10^9.(0.3).2 + 10^9.(0.5).4 + 10^9.(0,2).3 = 32.10^8$
$P2 \Rightarrow 10^9.(0.3).3 + 10^9(0.5).3 + 10^9.(0,2).3 = 30.10^8$

B.
$P1 \Rightarrow 32.10^8 / 10^9 = 3,2$ (clock cycles / instructions)
$P2 \Rightarrow 30.10^8 / 10^9 = 3$

C.
$P1 \Rightarrow 32.10^8 / 3.10^9 = 1.06$ (clock cycles / clockrate)
$P2 \Rightarrow 30.10^8 / 1.5.10^9 = 2$

D.
execution_time_P1 / execution_time_P2 = performance_P2 / performance_P1

$\Rightarrow \dfrac{2}{1.06} = 1.89$

* P1 is faster than P2 1.9 times.