Task 1: (09 points)

1. Estimate the effort using the Application Composition Model (COCOMO II) for an ATM system with 17 medium screens, 17 medium reports, and 85 components. Assume 15% reuse. Calculate the estimates for Nominal maturity levels.

Object type	Complexity weight		
	Simple	Medium	Difficult
Screen	1	2	3
Report	2	5	8
3GL component			10

Calculating Unadjusted Object Points (OP):

Screens: 17 screens×2=34

Reports: 17 reports×5=85

Components: 85 components×10=850

Total Unadjusted Object Points (OP): 34+85+850=969

Assuming 15% reuse, we calculate the Net Object Points (NOP):

NOP=969×(1−0.15)=969×0.85=823.65

Calculating Effort (the nominal productivity rate is 13 OP per person-month):

Effort=NOP/Nominal Productivity Rate(PROD)

Effort=823.65/13 ≈ 63.357 person-months

The estimated effort for the ATM system is approximately **63 person-months** with the updated nominal productivity rate of **13**.

2. Use Case Point Calculation

Unadjusted Use Case Weight (UUCW):

- Simple use cases: Weight = 5
- Average use cases: Weight = 10
- Complex use cases: Weight = 15

Given:

- 13 simple use cases: 13×5=65
- 15 average use cases: 15×10=150
- 13 complex use cases: 13×15=195

Total UUCW = 65 + 150 + 195 = 410

Unadjusted Actor Weight (UAW):

- Simple actors: Weight = 1
- Average actors: Weight = 2
- Complex actors: Weight = 3

Given:

- 4 simple actors: 4×1=4
- 7 average actors: 7×2=14
- 5 complex actors: 5×3=15

Total UAW = 4 + 14 + 15 = 33

Technical Complexity Factor (TCF):

The formula for TCF is:

TCF=0.6+(0.01×Total TFactor)

Total TFactor:

5+4+4+4+2+3+3+3+4+4+2+5+3=46
TCF=0.6+(0.01×46)=0.6+0.46=1.06

Environmental Complexity Factor (ECF):

The formula for ECF is:

ECF=1.4+(−0.03×Total EFactor)
Total EFactor:
3+3+5+5+3+3+0+3=25
ECF=1.4+(−0.03×25)=1.4−0.75=0.65

UCP:

The formula for UCP is:

UCP=(UUCW+UAW)×TCF×ECF

Substituting the values:

UCP=(410+33)×1.06×0.65=443×1.06×0.65=305.227

Total Effort in Person Hours = UCP*PF = 305.227*15 = 4,578.405 person-hours

Task 2

A software team delivers a software increment to end users. The users uncovered eight defects during the first month of use. Before delivery, the software team found 240 errors during formal technical reviews and all testing tasks. What is the overall DRE for the project after one month's usage?

DRE= Defects removed before delivery/(Defects found after delivery
+Defects removed before delivery)
Defects found before delivery = 240
Defects found after delivery (in one month) = 8

DRE = 240/(240+8) = 0.9677

DRE: The software team was able to remove approximately **96.77%** of defects before delivery.

Note that this is based on defects found within the first month after delivery and could change over time.

2. Assume an average productivity of 700 LOC per person-month, an estimated 35,000 LOC for the current project, and a labor rate of $10,000 per month. What is the estimated cost of this project? How many person-months will this project take (round up)?

Person-Months Calculation
First, let's calculate the number of person-months needed for the project:
Average productivity: 700 LOC per person-month
Estimated LOC for the project: 35,000

Person Months = Estimated LOC/Average Productivity
Person Months = 35000/700 ~= 50
Rounding up to the nearest whole number, we get 50 person-months.

Estimated Cost Calculation
Now that we know the number of person-months, we can calculate the estimated cost:

Number of person-months: 50
Labour rate: $10,000 per month

Estimated Cost = (Person Months)*(Labor Rate)
Therefore, the estimated cost of this project is $500,000.