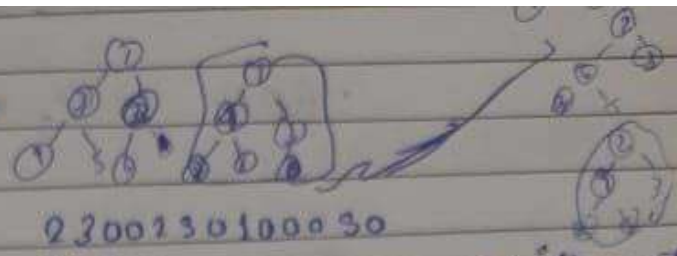

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1. Write a program to evaluate the arithmetic statement.

$P = ((X-(Y+Z)) * (A \wedge B)) / (C \wedge D \wedge E)$

(i) Two address instructions (ii) One address (iii) Zero address instructions

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$P = (A-B) * (((C-D \wedge E) / F) / G)$

Two address instruction →

Sol:

MOV	R_1, X	$R_1 \leftarrow M[X]$
SUB	R_1, Y	$R_1 \leftarrow M[Y] - R_1$
ADD	R_2, Z	$R_1 \leftarrow M(Z) + R_1$
MOV	R_2, A	$R_2 \leftarrow M[A]$
POW	R_2, B	$R_2 \leftarrow R_2 \wedge M[B]$
MUL	R_1, R_2	$R_1 \leftarrow R_1 * R_2$
MOV	R_2, C	$R_2 \leftarrow M[C]$
POW	R_2, D	$R_2 \leftarrow R_2 \wedge M[D]$
MUL	R_2, E	$R_2 \leftarrow R_2 * M[E]$
DIV	R_1, R_2	$R_1 \leftarrow R_1 / R_2$
MOV	P, R_1	$M[P] \leftarrow R$

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Three address

SUB R_1, X, Y $R_1 \leftarrow M[X] - M[Y]$

ADD R_1, Z, R_2 $R_2 \leftarrow R_2 + M[Z]$

POW R_1, A, B $R_1 \leftarrow M[A] \wedge M[B]$

MUL R_3, R_2, R_1 $R_3 \leftarrow R_2 * R_1$

POW R_1, C, D $R_1 \leftarrow M[C] \wedge M[D]$

MUL R_2, R_1, E $R_2 \leftarrow R_1 * E$

DIV $R_1, R_2, R_3 \Rightarrow R_1 \leftarrow R_3 / R_2$

Zero address

$XY+Z* = AB \wedge CD \wedge E * +$

Push	X	TOS $\leftarrow$ X
Push	Y	TOS $\leftarrow$ Y
SUB		TOS $\leftarrow$ X - Y
PUSH	Z	TOS $\leftarrow$ Z
ADD		TOS $\leftarrow$ X - Y + Z
PUSH	A	TOS $\leftarrow$ A
PUSH	B	TOS $\leftarrow$ B
POW		TOS $\leftarrow$ A ^ B
MUL		TOS $\leftarrow$ (X - Y + Z) * (A ^ B)

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PUSH	C	TOS ← C
PUSH	D	TOS ← D
POP		TOS ← C ∧ D
PUSH	E	TOS ← E
MUL		TOS ← (C ∧ D) * E
DIV		TOS ← ((X-Y+2) * (A ∧ B)) / (C ∧ D * E)
POP	P	M[P] ← TOS

(2) Sol:

AB - CDE * - F / G / *

PUSH	A	TOS ← A
PUSH	B	TOS ← B
SUB		TOS ← A - B
PUSH	C	TOS ← C
PUSH	D	TOS ← D
PUSH	E	TOS ← E
MUL		TOS ← D * E
SUB		TOS ← C - (D * E)
PUSH	F	TOS ← F
DIV		TOS ← (C - D * E) / F
PUSH	G	TOS ← G
DIV		TOS ← (C - D * E) / F / G
MUL		TOS ← (A - B) * ((C - D * E) / F / G)
POP	P	M[P] ← TOS

Spiral