

1. Computer Number System

Convert decimal to hex.

5	5
9	9
20	14
23	17
2019	7E3
2020	7E4

2. Computer Number System

Convert decimal to octal. Write the octal digits in ascending order. Convert this new octal to hex.

2019	3743	→	3347	→	6E7
2020	3744	→	3447	→	727

3. Computer Number System

Convert hex to oct

100_{16}	400
508_{16}	2410
$89B_{16}$	4233
$354C_{16}$	32514
1060_{16}	10140
195_{16}	625
$88F_{16}$	4217

4. Computer Number System

Convert to bin and count 1's number

4879_{16}	100100001111001	7
$BCDEF_{16}$	10111100110111101111	15
82712_{10}	10100001100011000	6
654_{10}	1010001110	5
357_8	11101111	7
$88A_{16}$	100010001010	4

5. Recursive Function

Find $f(f(f(50)))$ where $[a/b]$ = greatest integer function and $|a|$ = absolute value function

$$f(x) = \begin{cases} f(\lfloor x/3 \rfloor) + 2 & \text{if } x > 20 \\ f(|10 - x|) - 3 & \text{if } 8 \leq x \leq 20 \\ x^2 - x + 1 & \text{if } x < 8 \end{cases}$$

$$f(50) = f\left(\left\lfloor \frac{50}{3} \right\rfloor\right) + 2 = f(16) + 2 = 30$$

$$f(16) = f(|-6|) - 3 = 28$$

$$f(6) = 6^2 - 6 + 1 = 31$$

$$f(30) = f\left(\left\lfloor \frac{30}{3} \right\rfloor\right) + 2 = f(10) + 2 = 0$$

$$f(10) = f(0) - 3 = -2$$

$$f(0) = 1$$

$$\text{Therefore } f(f(f(50))) = f(f(30)) = f(0) = 1$$

6. Recursive Function

If $f(1) = 8$ and

$$f(n+1) = 2 * f(n) - 4,$$

find $f(5)$.

$$f(1) = 8 \Rightarrow f(2) = 2 * f(1) - 4 = 12$$

$$f(2) = 12 \Rightarrow f(3) = 2 * f(2) - 4 = 20$$

$$f(3) = 20 \Rightarrow f(4) = 2 * f(3) - 4 = 36$$

$$f(4) = 36 \Rightarrow f(5) = 2 * f(4) - 4 = 68$$

7. Recursive Function 6

Given: $f(1) = 3$

$$f(2) = 5$$

$$f(n) = 4 * f(n-1) - f(n-2)$$

Find the smallest value of n such that $f(n) > 300$.

8. Recursive Function 11

Find $f(f(f(16)))$ given:

$$f(x) = \begin{cases} f(x-4) + 2 & \text{if } x \geq 10 \\ f(x+1) - 1 & \text{if } 6 < x < 10 \\ x + 3 & \text{if } x \leq 6 \end{cases}$$

9. What does this program do?

a	b	c	d	e	f
10	2	40	5	100	16
10	2	40	10	100	16
10	2	40	10	0	16
10	2	20	10	0	16
10	2	20	10	0	4
10	2	20	10	0	4
10	2	20	10	0	2

$$g = a * b + c + d + e + f * a$$

$$= 10 * 2 + 20 + 10 + 0 + 2 * 10 = 20 + 20 + 10 + 0 + 20 = 70$$

$$h = g / (c - a) + b * (c \uparrow e + f) / 3 - b \uparrow a / f \uparrow 5 / b$$

$$= 70 / (20 - 10) + 2 * (20 \uparrow 0 + 2) / 3 - 2 \uparrow 10 / 2 \uparrow 5 / 2$$

$$= 70 / 10 + 2 * (1 + 2) / 3 - 1024 / 32 / 2$$

$$= 7 + 2 * 3 / 3 - 32 / 2$$

$$= 7 + 2 - 16$$

$$= -7$$

10. What does this program do?

a	b	c	d	e	f
100	20	5	4	4	
100	20	5	4	4	2
100	20	5	5	4	2
50	20	5	5	4	2
30	20	5	5	4	2
30	1	5	5	4	2

$$g = f \uparrow c / e - e * f + b \uparrow (a + 2 * d) * c * e / (d * e)$$

$$= 2 \uparrow 5 / 4 - 4 * 2 + 1 \uparrow (30 + 2 * 5) * 5 * 4 / (5 * 4)$$

$$= 32 / 4 - 4 * 2 + 1 \uparrow 40 * 5 * 4 / (5 * 4)$$

$$= 32 / 4 - 8 + 1 * 5 * 4 / 20$$

$$= 8 - 8 + 20 / 20$$

$$= 8 - 8 + 1$$

$$= 1$$