ACSL

American Computer Science League

JUNIOR DIVISION

个人考号/Exam Code:_____   姓名/Name:_____   学校/School:_____

1. Computer Number Systems Convert the date of this year's All-Star Contest: 5/23/2020 to hex. Write in the form: M/DD/YYY	**1.**
2. Computer Number Systems Which number has the most 2's when converted to octal? 508_{16} $88A_{16}$ 195_{16} $348A_{16}$ 1050_{16}	**2.**
3. Recursive Functions Find f(90) given:	**3.**

$$f(x)= \begin{cases} 2 * f(x/3) - 1 & \text{if x is a multiple of 3 and odd} \\ -1 * f(x/2) + 2 & \text{if x is even} \\ x + 4 & \text{otherwise} \end{cases}$$

4. Recursive Functions Find f(f(f(6))) given:	**4.**

$$f(x)= \begin{cases} 2 * f(x-3) - 1 & \text{if x > 10} \\ f(x-2) + 3 & \text{if 2 <= x <= 10} \\ 3\text{^}x * x\text{^}3 & \text{if x < 2} \end{cases}$$

5. What Does This Program Do? - Branching

What is outputted when this program is executed?

```
a = 12 : b = 6 : c = 3 : d = 2
if a  ==  b * d then
    e = a / b
end if
if b - d  ==  a / c then
    e = e + a / c
end if
e = a / c - e
if b / c ==  a / e then
    a = 2 * d
else
    a = 2 * e
end if
if (a < b) || (c < d) then
    a = a + b
else
    c = c + d
end if
if (a < d)  && (b + c > c * c) then
    d = a + c
else
    c = d - b
end if
x = b / a + c * e / (d + b) - (b + d) / a * a
print x
end
```

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个人考号/Exam Code:_____   姓名/Name:_____   学校/School:_____

1. Computer Number Systems 将本竞赛的全明星赛日期 5/23/2020 转化成十六进制。 书写格式：M/DD/YYY	**1.**
2. Computer Number Systems 下列哪个数字转化成八进制后2的数量最多？ 508_{16} $88A_{16}$ 195_{16} $348A_{16}$ 1050_{16}	**2.**
3. Recursive Functions 求 f(90)，已知： $f(x)=$ 2 * f(x /3) - 1 if x is a multiple of 3 and odd 如果x是奇数，且还是3的倍数 -1 * f(x/2) + 2 if x is even 如果x是偶数 x + 4 otherwise 否则	**3.**
4. Recursive Functions 求 f(f(f(6)))，已知： $f(x)=$ 2 * f(x-3) - 1 if x > 10 f(x-2) + 3 if 2 <= x <= 10 3^x * x^3 if x < 2	**4.**

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5. What Does This Program Do? - Branching

5.

执行下列程序后，输出值是多少？

```
a = 12 : b = 6 : c = 3 : d = 2
if a  ==  b * d then
    e = a / b
end if
if b - d  ==  a / c then
    e = e + a / c
end if
e = a / c - e
if b / c ==  a / e then
    a = 2 * d
else
    a = 2 * e
end if
if (a < b) || (c < d) then
    a = a + b
else
    c = c + d
end if
if (a < d)  && (b + c > c * c) then
    d = a + c
else
    c = d - b
end if
x = b / a + c * e / (d + b) - (b + d) / a * a
print x
end
```