

American Computer Science League

2025-2026 • Contest 1: Short Problems • Junior Division

1. Computer Number Systems

Convert 52326_{16} to octal.

- A. 336677
- B. 1221446
- C. 2443112
- D. 1222045
- E. 1622045

2. Computer Number Systems

What is the average of the following two numbers in base 10?

$$36_8 \qquad 74_8$$

- A. 36
- B. 37
- C. 45
- D. 112
- E. 132

3. Recursive Functions

Find $f(6)$ given:

$$f(x) = \begin{cases} 2 & \text{if } x = 1 \\ 2 \cdot f(x-1) + 1 & \text{if } x > 1 \end{cases}$$

- A. 5
- B. 11
- C. 23
- D. 95
- E. 191

4. Recursive Functions

Find $f(16)$ given:

$$f(x) = \begin{cases} f(x-3) + x & \text{if } x > 10 \\ 2 \cdot f(x-2) & \text{if } 8 \leq x \leq 10 \\ 2x + 3 & \text{if } x < 8 \end{cases}$$

- A. 73
- B. 15
- C. 60
- D. 30
- E. 89

5. What Does This Program Do? (Branching)

Which of the following input values will print “wrong” when executed?

```
input a, b
a = a ^ 2
b = b ^ 2
c = a + b
d = sqrt(c)
if d == int(d) then
    output a, b, c
else
    output "wrong"
end if
```

- A. a=3, b=4
- B. a=5, b=12
- C. a=5, b=10
- D. a=9, b=12
- E. a=7, b=24

6. What Does This Program Do? (Branching)

Run the following program with each number from 1 to 25, inclusive. How many of them are output?

```
input num
if num % 3 == 0 && num % 4 == 0 then
    output num
end if
if num % 5 == 0 || num % 7 == 0 then
    output num
end if
```

- A. 11
- B. 10
- C. 9
- D. 8
- E. 7