(1) (MCQ) Which is larger? Twice the sum of the first 1000 natural numbers, or the sum of the first 1000 odd natural numbers?
   (a) Twice the sum of the first 1000 natural numbers.
   (b) the sum of the first 1000 odd natural numbers.
   (c) They are equal.
   Correct answer: (b).

(2) (Short answer) Find a formula for $1 + 4 + 7 + \cdots + 3n - 2$ (the sum of first n numbers which leave remainder 1 when divided by 3.
   Correct answer: $(3n - 1)n/2$.

(3) (MSQ) Which following is the same as
$$\sum_{i=1}^{n} \sum_{j=1}^{i} (2i + j)$$
   for all positive integers n?
   (a)
$$\sum_{i=1}^{n} \sum_{j=1}^{i} (2j + i)$$
   (b)
$$\sum_{j=1}^{n} \sum_{i=j}^{n} (2i + j)$$
   (c)
$$\sum_{j=1}^{n} \sum_{i=1}^{j} (2i + j)$$
   (d)
$$\sum_{i=1}^{n} \sum_{j=i}^{n} (2j + i)$$
   Correct answers: (b) and (d).

(4) (Short Answer) The *Online Encyclopedia of Integer Sequences (OEIS)* (https://oeis.org) has a huge collection of integer sequences. Each sequence has a unique identifier. For example, the sequence of triangular numbers has identifier A000217 and can be found at https://oeis.org/A000217. Consider the sequence $\{C_n\}$ given by the rule:
   - $C_0 = 1$.
   - $C_n = \sum_{k=0}^{n-1} C_k C_{n-1-k}$ for $n \geq 1$.
   What is the unique identifier of this sequence on OEIS?
   Correct Answer: A000108

(5) (Numerical, exact value) Use OEIS to find C_{30} in the previous problem

Correct answer: 3814986502092304

(6) (MCQ) Let $S_n = \{x \in \mathbf{N} \mid x \text{ is divisible by } n\}$. Then $S_9 \cap S_{12}$ is equal to which of the following sets?

(a) S_{72}

(b) S_3

(c) S_{36}

(d) S_{24}

Correct answer: (c).

(7) Let S_n be as in the previous problem. How many natural numbers less than 100 are elements of $S_9 \cup S_{12}$?

(a) 3

(b) 17

(c) 19

(d) 33