Question 1
What are all the values of \( n \) such that \( 2^n + 2^{11} + 2^8 \) is a perfect square?

Question 2
ABC is a triangle with \( |AB| = |AC| \) and \( \angle BAC = 20^\circ \). E is a point on AB with \( \angle BCE = 50^\circ \) and D is point on AC with \( \angle CBD = 40^\circ \). What is the angle \( \angle CED \)?

Question 3
A positive integer \( n \) has first (decimal) digit 9. If this digit is moved to the end, the resulting integer is exactly \( n/7 \). What is the smallest \( n \) satisfying this condition?

Question 4
A real-valued function \( f \) is defined on the integers, and satisfies:

\[
\begin{align*}
(1) & \quad f(0) = 1 \\
(2) & \quad f(x + y + 1) + 3 = f(x + 1) + f(y + 1) + 2xy
\end{align*}
\]

What is the \( f(45) - f(4) \).

Question 5
Two people, A and B, agree to play the following game. A barrel is filled with a large number of balls. Half the balls are labelled A and half B. The players take it in turns to draw a ball from the barrel. If it is labelled with their name they win and the game ends. Otherwise they replace their ball and the other player draws. If A goes first, what is the probability that A wins?

Question 6
Which positive integers can be written as the sum of two or more consecutive positive integers? For example 6 = 1 + 2 + 3 but 8 cannot be thus written.