



## Problem 4. «Hash function FNV2»

The FNV2 hash function is derived from the function [FNV-1a](#). FNV2 processes a message  $x$  composed of bytes  $x_1, x_2, \dots, x_n \in \{0, 1, \dots, 255\}$  in the following way:

- 1)  $h \leftarrow h_0$ ;
- 2) for  $i = 1, 2, \dots, n$ :  $h \leftarrow (h + x_i)g \bmod 2^{128}$ ;
- 3) return  $h$ .

Here  $h_0 = 144066263297769815596495629667062367629$ ,  $g = 2^{88} + 315$ .

Find a collision, that is, two different messages  $x$  and  $x'$  such that  $\text{FNV2}(x) = \text{FNV2}(x')$ . Collisions on short messages and collisions that are obtained without intensive calculations are welcomed. Supply your answer as a pair of two hexadecimal strings which encode bytes of colliding messages.