

lowest n

① $\text{int32_t mask} = (1 \ll n) - 1;$

Ex: $n = 4$ $0 \times 8A$

 $1 < 4$
$$a_{-1} = 00010000 = 16 \text{ (dec)}$$
$$0 \dots 00 \underline{0111} = 15 (\text{dec})$$

$x \& \text{mask} = \text{extract lowest 4}$

[illegible]

② int32_t mask = -1; // all 1-bit

Ex: $n = 4$ Dx 29

i=0 || || << 1
= || 10

i=1 11 . . . 10 << 1
 11 . . . 100

$$\frac{i=2}{11 \dots 1000}$$

i=3 11...10000

$$\Rightarrow \sim \text{mask} = \underbrace{00 \dots 0111}_{} \& \underbrace{0x29}_{\substack{0010 \quad 1001}}$$

$$\approx \underline{0x9}$$

encode_utf8 : Example input: 233

1-byte: $0 \dots$ \Rightarrow # you're encoding are just the . bits
 \uparrow
 MSB

2-bytes: $110 \dots$ $10 \dots \Rightarrow \dots = 233$ in binary

3-bytes: $1110 \dots$ $10 \dots$ $10 \dots$

4-bytes: $11110 \dots$ $10 \dots$ $10 \dots$ $10 \dots$

\Rightarrow Need to figure out how many bytes I need to encode
Idea: compare input # to maximum value each pattern can encode

\Rightarrow max val = all 1-bits for each dot -

1-byte = $0x000F = 0x7F$
 = $0b1111111$

2-byte: $0b1111111111 = 11$ one-bits
 = $0x7FF$

3-bytes: $0b1 \dots 1 = 16$ one-bits
 = $0xFFFF$

4-bytes: $0b1 \dots 1 = 21$ one-bits
 = $0xFFFFFFFF$