

**Find the domain  $1 + \ln(1 + \ln(1 + \ln(1 + x)))$**

We need to find values of "x" such that the argument of the logarithmic function evaluates to a positive number. Hence,

$$1) 1 + x > 0,$$

$$\text{so } x > 0$$

$$2) 1 + \ln(1 + x) > 0,$$

$$\text{so } \ln(1 + x) > -1,$$

$$\text{then } 1 + x > e^{-1} \text{ and}$$

$$\text{thus } x > e^{-1} - 1$$

$$3) 1 + \ln(1 + \ln(1 + x)) > 0,$$

$$\text{so } \ln(1 + \ln(1 + x)) > -1,$$

$$\text{therefore } 1 + \ln(1 + x) > e^{-1},$$

$$\ln(1 + x) > e^{-1} - 1,$$

$$1 + x > e^{e^{-1}-1},$$

$$x > e^{e^{-1}-1} - 1$$

Since  $e^{-1} - 1 < e^{e^{-1}-1} - 1 < 0$ , then domain is  $x > 0$

**Answer:  $x > 0$**