

Roll No.:

Section:

**Consigns:** You should be extra cautious about small mistakes, try to explain as much as possible, and do not forget to justify every statements and every steps in your answers.

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**Ex. 1: 3 prime numbers?**

Given that  $a, b, c \in \mathbb{N}^*$  are three non-negative integers, if we have  $abc + ab + bc + ca + a + b + c + 1 = 1001$ , what is the value of  $a + b + c$ ? Hint:  $1001 = 7 \times 11 \times 13$ .

**Answer:****Ex. 2: Cables**

A telephone company places round cables in round ducts.

Assuming the diameter of a cable is 2 cm, what would the diameter of the duct be for two cables, three cables and four cables?

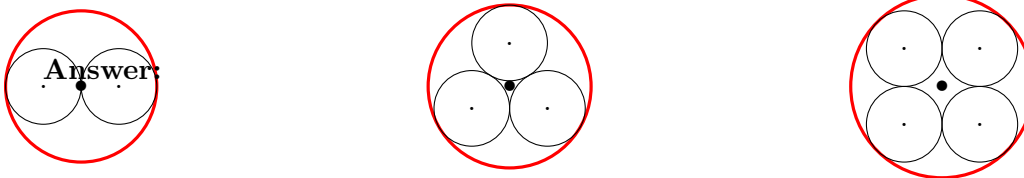


Figure 1: Cables

**Ex. 3: About differentiability**

Let  $f$  be a function from an interval  $[a, b]$  to  $\mathbb{R}$  (with  $a, b \in \mathbb{R}, a < b$ ), and  $x_0 \in [a, b]$ .

1. Recall the *formal* definition of  $f$  being differentiable at this point  $x_0$  (as a pure formula with variables, well introduced with quantifiers  $\forall$  and  $\exists$ ).
2. If  $f$  is differentiable at  $x_0$ , does this mean  $f$  is continuous at  $x_0$ ? If yes, (try to) prove it. If not, (try to) give a counter-example.

**Answer:**