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Question 1: Fill in the blanks

For all objects T if T is a triangle then T has three sides.

- (a) All triangles have three sides.
- (b) Every triangle has three sides.
- (c) If an object is a triangle, then it has three sides.
- (d) If T is a triangle, then T has three sides.
- (e) For all triangles T, T has three sides.

Question 2: Relation R

Let $A = \{3, 5, 7\}$ and $B = \{15, 16, 17, 18\}$, and define a relation R from A to B as follows: For all $(x, y) \in A \times B$, $(x, y) \in R \Leftrightarrow \frac{y}{x}$ is an integer.

- (a) Yes for $3\,R\,15$ and $(3, 18) \in R$; No for $3\,R\,16$ and $(7, 17) \in R$.
- (b) $R = \{(3, 15), (3, 18), (5, 15), (7, 14), (7, 17)\}$
- (c) Domain: $A = \{3, 5, 7\}$, Co-domain: $B = \{15, 16, 17, 18\}$
- (d) Arrow diagram:

$$3 \to 15$$
$$3 \to 18$$
$$5 \to 15$$
$$7 \to 14$$
$$7 \to 17$$

- (e) R is not a function from A to B since 3 is related to both 15 and 18.

Question 3: Functions F and G

Define functions F and G from $\mathbb{R}$ to $\mathbb{R}$ by the following formulas: $F(x) = (x + 1)(x - 3)$ and $G(x) = (x - 2)^2 - 7$.

Answer: $F \neq G$. They are distinct functions with different expressions.