



PrepPals

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CSCA [Math] Recall Questions Collection

[Preview]

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Part I: Single Choice Questions

There are 48 questions in this section, each worth 48 points, for a total of 48 points.

1. Given two sets A and B: Let $A = \{x \in \mathbb{Z} \mid -1 \leq x < 5\}$ and $B = \{x \in \mathbb{Z} \mid 0 < x \leq 3\}$. Find the intersection $A \cap B$.
A. $\{x \mid -1 < x < 5\}$
B. $\{x \mid 0 < x \leq 3\}$
C. $\{x \mid -1 \leq x \leq 0\}$
D. $\{x \mid 0 \leq x < 5\}$
2. The domain of the function $f(x) = \sqrt{4-x} + \frac{1}{x-2}$ is:
A. $(2, 4]$
B. $(-\infty, 4]$
C. $(-\infty, 2) \cup (2, +\infty)$
D. $(-\infty, 2) \cup (2, 4]$
3. The inverse function of $f(x) = \sqrt{x+4} - 7$ is:
A. $f^{-1}(x) = x^2 + 14x + 45$
B. $f^{-1}(x) = x^2 + 14x - 53$
C. $f^{-1}(x) = (x+7)^2 + 4$
D. $f^{-1}(x) = (x-7)^2 - 4$

Reference answers and explanations

Part I: Single Choice Questions

1. **【Answer】** B

【Explanation】

The task is to find the intersection $A \cap B$, i.e. the elements common to both sets. First list the elements of each set.

$$A = \{x \in \mathbb{Z} \mid -1 \leq x < 5\} = \{-1, 0, 1, 2, 3, 4\}$$

$$B = \{x \in \mathbb{Z} \mid 0 < x \leq 3\} = \{1, 2, 3\}$$

Therefore,

$$A \cap B = \{1, 2, 3\} = \{x \mid 0 < x \leq 3\}$$

Hence B is correct.

2. **【Answer】** D

【Explanation】

For $f(x) = \sqrt{4-x} + \frac{1}{x-2}$ we require both terms to be defined.

(1) For $\sqrt{4-x}$ the radicand must be nonnegative: $4-x \geq 0 \rightarrow x \leq 4$

(2) For $\frac{1}{x-2}$ the denominator must be nonzero: $x-2 \neq 0 \rightarrow x \neq 2$

Combining these conditions gives the domain:

$$x \leq 4, x \neq 2 \rightarrow (-\infty, 2) \cup (2, 4].$$

Hence D is correct.

Notes on the other choices:

Option A Values $x < 2$ also satisfy both conditions (both terms are defined there), so those are wrongly excluded.

Option B It includes $x = 2$, where the rational term is undefined.

Option C It allows $x > 4$, where $4-x < 0$ and the square root is undefined.

3. **【Answer】** A

【Explanation】

$$\text{Let } y = f(x), y = \sqrt{x+4} - 7.$$

$$\text{Solve for } x \text{ in terms of } y: y + 7 = \sqrt{x+4} \rightarrow x+4 = (y+7)^2$$

$$\rightarrow x = (y+7)^2 - 4 \rightarrow x = y^2 + 14y + 49 - 4$$

$$\rightarrow x = y^2 + 14y + 45$$

Interchange x and y to obtain the inverse function:

$$y = x^2 + 14x + 45 \rightarrow f^{-1}(x) = x^2 + 14x + 45$$

The inverse is found by swapping the independent and dependent variables, as shown above. Hence A is correct.

Notes on the other choices:

Option B results from an incorrect expansion of $(y + 7)^2$.

Option C should read $(x + 7)^2 - 4$; the sign was mishandled when rearranging the equation.

Option D has the same sign issue as C.