# MTH101 Solution: Practice Questions
# Lecture No.8: Graphs of Functions
# Lecture No.9: Limits

**Choose the correct option for the following questions:**

**1)** If a vertical line insects the graph of the equation $y = f(x)$ at two points, then which of the following is true?

- **I.** It represents a function.
- **II.** It represents a parabola.
- **III.** It represents a straight line.
- **IV.** It does not represent a function. Correct option

**2)** Which of the following is the reflection of the graph of $y = f(x)$ about *y*-axis?

- **I.** $y = -f(x)$
- **II.** $y = f(-x)$ Correct option
- **III.** $-y = -f(x)$
- **IV.** $-y = f(-x)$

**3)** Given the graph of a function $y = f(x)$ and a constant *c*, the graph of $y = f(x) + \mathrm{c}$ can be obtained by ________.

- **I.** Translating the graph of $y = f(x)$ up by c units. Correct option
- **II.** Translating the graph of $y = f(x)$ down by c units.
- **III.** Translating the graph of $y = f(x)$ right by c units.
- **IV.** Translating the graph of $y = f(x)$ left by c units.

**4)** Given the graph of a function $y = f(x)$ and a constant *c*, the graph of $y = f(x - c)$ can be obtained by ________.

- **I.** Translating the graph of $y = f(x)$ up by c units.
- **II.** Translating the graph of $y = f(x)$ down by c units.
- **III.** Translating the graph of $y = f(x)$ right by c units. Correct option
- **IV.** Translating the graph of $y = f(x)$ left by c units.

**5)** Which of the following is the reflection of the graph of $y = f(x)$ about *x*-axis?

- **I.** $y = -f(x)$ Correct option
- **II.** $y = f(-x)$
- **III.** $-y = -f(x)$
- **IV.** $-y = f(-x)$

**Q.No.6:** If $\lim_{x\to 8^-} h(x) = 18 + c$ and $\lim_{x\to 8^+} h(x) = 7$ then find the value of '$\boldsymbol{c}$' so that $\lim_{x\to 8} h(x)$ exists.

**Answer:** $c = -11$

**Solution:** For the existence of $\lim_{x\to 8} h(x)$ we must have

$$\lim_{x\to 8^-} h(x) = \lim_{x\to 8^+} h(x),$$

By placing the values we get

$$18 + c = 7,$$
$$\Rightarrow c = 7 - 18 = -11.$$

**Q.No.7:** Find the limit by using the definition of absolute value $\lim_{x\to 0^+} \frac{x}{|2x|}$.

**Answer:** $\frac{1}{2}$

**Solution:**

$$\because \lim_{x\to 0^+} \frac{x}{|2x|},$$

where $|2x| = \begin{cases} 2x & x \geq 0, \\ -2x & x < 0. \end{cases}$

So $|2x| \to 2x \ as \ x \to 0^+.$

$$\therefore \lim_{x\to 0^+} \frac{x}{|2x|} = \lim_{x\to 0^+} \frac{x}{2x} = \lim_{x\to 0^+} \frac{1}{2} = \frac{1}{2}.$$

**Q.No.8:** Find the limit by using the definition of absolute value $\lim_{x\to 0^-} \frac{|x+5|}{x+5}$.

**Answer:** -1

**Solution:**

$$\because \lim_{x\to 0^-} \frac{|x+5|}{x+5}$$

where $|x+5| = \begin{cases} x+5 & (x+5) \geq 0, \\ -(x+5) & (x+5) < 0. \end{cases}$

$$\therefore \lim_{x\to 0^-} \frac{|x+5|}{x+5} = \lim_{x\to 0^-} \frac{-(x+5)}{x+5} = \lim_{x\to 0^-} (-1) = -1.$$

**Q.No.9:** Evaluate: $\lim_{x\to\infty} \frac{x^2 - 3x + 1}{x^3 + 2x^2 - 5x + 3}$.

**Answer:** 0

**Solution:**

$$\lim_{x\to\infty} \frac{x^2-3x+1}{x^3+2x^2-5x+3} = \lim_{x\to\infty} \frac{\frac{1}{x}-\frac{3}{x^2}+\frac{1}{x^3}}{1+\frac{2}{x}-\frac{5}{x^2}+\frac{3}{x^3}}, \quad \left(\because \text{ taking } x^3 \text{ as common}\right)$$

$$= \frac{\frac{1}{\infty}-\frac{3}{\infty^2}+\frac{1}{\infty^3}}{1+\frac{2}{\infty}-\frac{5}{\infty^2}+\frac{3}{\infty^3}}, \quad \left(\because \text{ on applying limit}\right)$$

$$= \frac{0}{1}, \quad \left(\because \text{ any number divided by infinity is zero}\right)$$

$$= 0. \quad \left(\because \frac{0}{1}=0\right)$$

**Q.No.10:** Evaluate: $\lim_{z\to\infty} \frac{z^3+2z^2-5z+3}{z^2-3z+1}$.

**Answer:** $\infty$

**Solution:**

$$\lim_{z\to\infty} \frac{z^3+2z^2-5z+3}{z^2-3z+1} = \lim_{z\to\infty} \frac{1+\frac{2}{z}-\frac{5}{z^2}+\frac{3}{z^3}}{\frac{1}{z}-\frac{3}{z^2}+\frac{1}{z^3}}, \quad \left(\because \text{ taking } x^3 \text{ as common}\right)$$

$$= \frac{1+\frac{2}{\infty}-\frac{5}{\infty^2}+\frac{3}{\infty^3}}{\frac{1}{\infty}-\frac{3}{\infty^2}+\frac{1}{\infty^3}}, \quad \left(\because \text{ on applying limit}\right)$$

$$= \frac{1}{0}, \quad \left(\because \text{ any number divided by infinity is zero}\right)$$

$$= \infty. \quad \left(\because \frac{1}{0}=\infty\right)$$