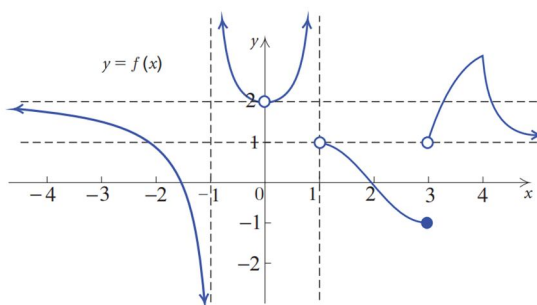


## Question 1

**6 Marks (1 each)**

Use the graph of  $f(x)$  to answer the following questions (if any)



- $\lim_{x \rightarrow 3} f(x)$
- $\lim_{x \rightarrow 0} f(x)$
- $2f(-2) + 3 \lim_{x \rightarrow 2} \frac{f(x)}{5x + 1}$
- Find all vertical asymptotes of  $f$  (if any).
- Find all horizontal asymptotes of  $f$  (if any).
- Discuss the continuity of  $f$  on its domain.

**4 Marks (2 each)**

Use the definition of limit to show the following:

- $\lim_{x \rightarrow -2} (1 - 2x) = 5$

2.  $\lim_{x \rightarrow \frac{3}{2}^+} \sqrt{2x - 3} = 0$

**8 Marks (2 each)**

1.  $f(x) = \frac{2x-1}{\sqrt{9x^2+4x-x}}$

2.  $f(x) = \frac{x}{\sqrt{9-x^2}}$

1.  $f(x) = \frac{\sin x}{x}$

2.  $f(x) = \frac{x|x| - 4}{x^2 - 2x}$

**3 Marks**

$$\lim_{x \rightarrow 0} \frac{a - \cos(bx)}{x^2} = 8$$
[illegible]

**20 Marks (2 each)**

1.  $\lim_{x \rightarrow -1} \frac{x^2 - 1}{2x + 1}$

2.  $\lim_{x \rightarrow 0} \frac{(x+2)^3 - 8}{x}$

3.  $\lim_{x \rightarrow \infty} (\sqrt{x^2 + 2} - x)$

4.  $\lim_{x \rightarrow 1} \left( \frac{1}{x-1} - \frac{2}{x^2-1} \right)$

5.  $\lim_{x \rightarrow 3} \frac{x - 3}{|x - 3|}$

6.  $\lim_{x \rightarrow \infty} \frac{2x + \sin x}{4x + 1}$

7.  $\lim_{x \rightarrow 0^+} \frac{\sqrt{1 - \sin^2(\frac{\pi}{2} - x)}}{3x}$

8.  $\lim_{x \rightarrow 0} \left[ \frac{1}{x} \left( \frac{1}{\sqrt{1+x}} - 1 \right) \right]$

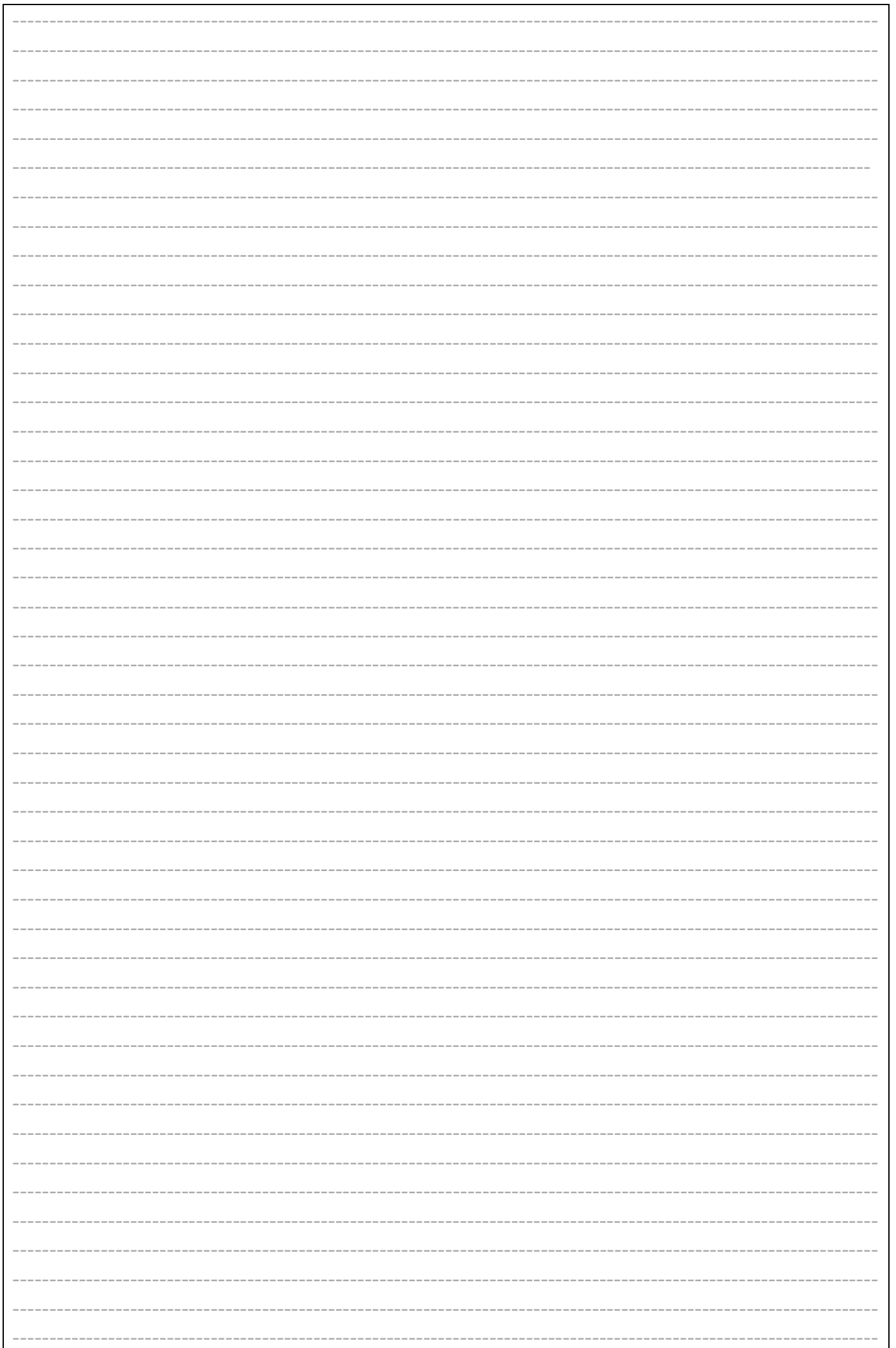
9.  $\lim_{x \rightarrow 2} \cos\left(\frac{x^2 - 4}{x + 1}\right)$

10.  $\lim_{x \rightarrow 0} \frac{x}{\tan(2x) + \sin(3x)}$

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- $$f(x) = \begin{cases} \sqrt{\frac{x+4}{x+b}}, & x > 0 \\ a+b, & x = 0 \\ \frac{\sin(2x)}{3x}, & x < 0 \end{cases}$$

is continuous on  $\mathbb{R}$ .

