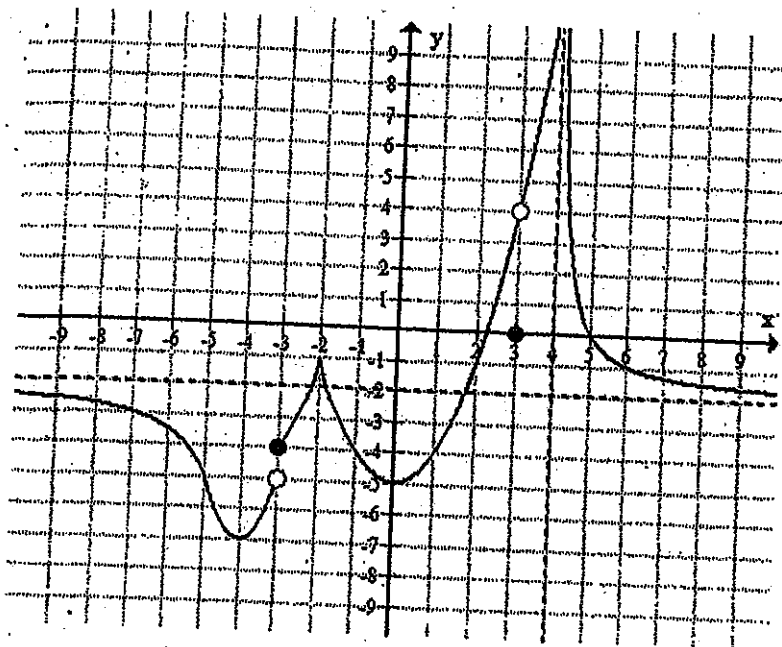


Panther ID: _____

NAME: _____

Solutions

Problem 1. (12 pts) The graph of a function f is given below. Answer the questions that follow.



(i) Find the following limits (one pt. each)

a) $\lim_{x \rightarrow -\infty} f(x) = -2$

b) $\lim_{x \rightarrow -3^-} f(x) = -5$

c) $\lim_{x \rightarrow -3^+} f(x) = -4$

d) $\lim_{x \rightarrow 3} f(x) = \text{DNE}$

(does not exist)

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

f) $\lim_{x \rightarrow 3} f(x) = 4$

g) $\lim_{x \rightarrow 4} f(x) = +\infty$

h) $\lim_{x \rightarrow +\infty} f(x) = -2$

(ii) (2 pts) Does f have any asymptote(s)? If yes, what kind? Write their equations.

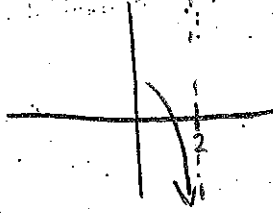
Yes, f has asymptotes:

- A vertical asymptote at $x=4$

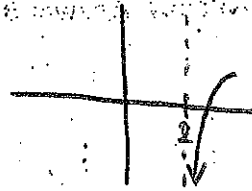
- A horizontal asymptote at $y=-2$

2. For each limit below, sketch the portion of the graph of f corresponding to the limit:

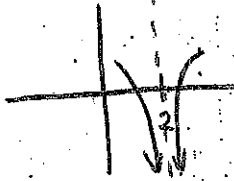
a) $\lim_{x \rightarrow 2^-} f(x) = -\infty$



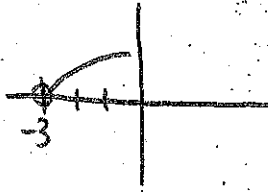
b) $\lim_{x \rightarrow 2^+} f(x) = -\infty$



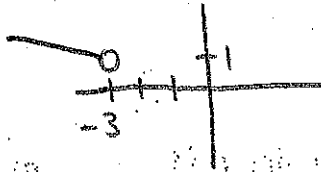
c) $\lim_{x \rightarrow 2} f(x) = -\infty$



e) $\lim_{x \rightarrow -3^+} f(x) = 0$



f) $\lim_{x \rightarrow -3^-} f(x) = 1$



g) Sketch the graph of a single function $f(x)$ satisfying all the limits a-f, and also $f(-3) = 2$, $f(1) = 0$,

$\lim_{x \rightarrow -\infty} f(x) = +\infty$

$\lim_{x \rightarrow +\infty} f(x) = 3$

← Added on the board!

