

"Average is 5 out of 10"

Name: "Key solution" ID: \_\_\_\_\_ S.N.: \_\_\_\_\_

Show all your work

**Question1:** (3 pts) Evaluate the limit  $\lim_{x \rightarrow 0^+} (\frac{1}{x} - \ln x)$ .

**Question2:** (3 pts) Sketch a graph of function  $f(x)$  which satisfies the following:

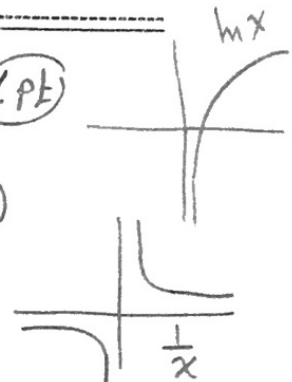
$$\lim_{x \rightarrow 0^-} f(x) = 2, \quad \lim_{x \rightarrow 0^+} f(x) = 0, \quad \lim_{x \rightarrow 4^-} f(x) = 3, \quad \lim_{x \rightarrow 4^+} f(x) = 0,$$

$$f(0) = 2, \quad f(4) = 1.$$

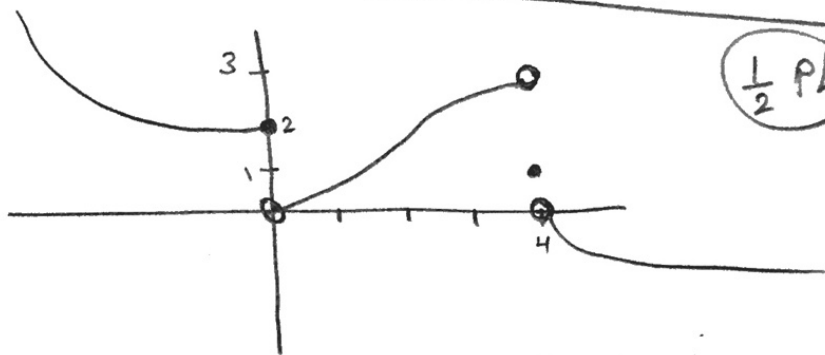
**Question3:** (4 pts) Sketch the graph of  $f(x) = \lfloor \cos x \rfloor$ ,  $-\pi \leq x \leq \pi$ , then find  $\lim_{x \rightarrow \frac{\pi}{2}} f(x)$ .

Q1)  $\lim_{x \rightarrow 0^+} (\frac{1}{x} - \ln x) = \lim_{x \rightarrow 0^+} \frac{1}{x} - \lim_{x \rightarrow 0^+} \ln x$  (1 pt)

$$= +\infty - (-\infty)$$
 (1 pt)
 
$$= \infty + \infty = +\infty$$
 (1 pt)

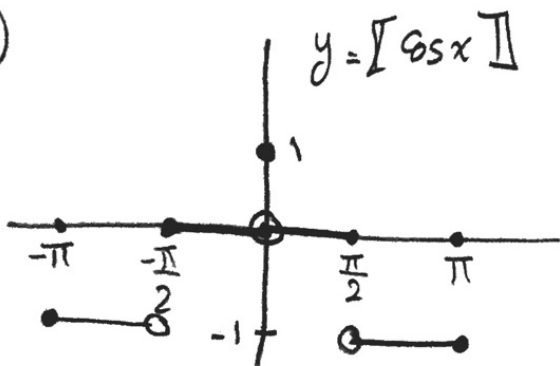


Q2)



(1/2 pt) each

Q3)



(2 pts)

$$\lim_{x \rightarrow \frac{\pi}{2}^+} f(x) = -1$$
 (1/2 pt)

$$\lim_{x \rightarrow \frac{\pi}{2}^-} f(x) = 0$$
 (1/2 pt)

$$\lim_{x \rightarrow \frac{\pi}{2}} f(x) \text{ D.N.E}$$
 (1 pt)