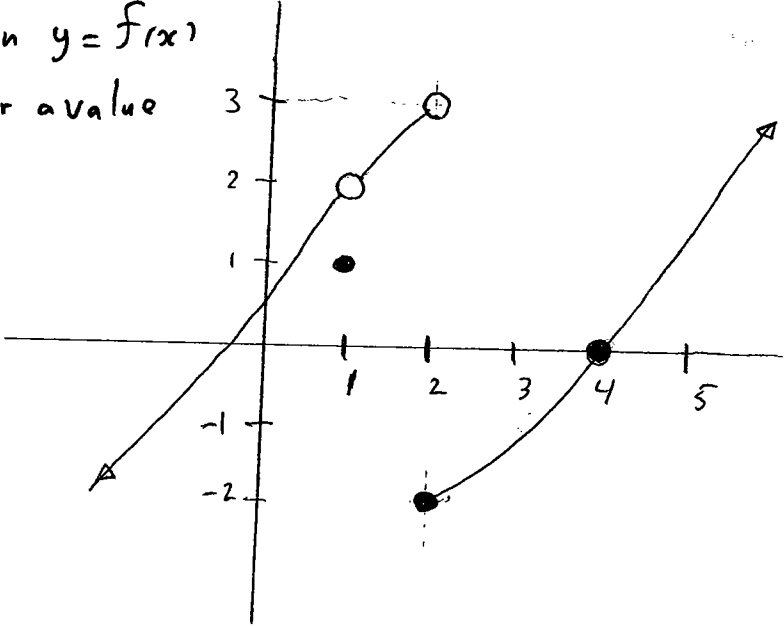


EXAM 1 B

PRINT NAME

① Given the graph of the function $y = f(x)$
Find the following. If a limit or a value
does not exist, then say so.



a) $\lim_{x \rightarrow 1} f(x)$

b) $f(1)$

c) Is f continuous @ $x=1$?
If Not, then give a reason

d) $\lim_{x \rightarrow 2^-} f(x)$

e) $\lim_{x \rightarrow 2^+} f(x)$

f) $\lim_{x \rightarrow 2} f(x)$

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

h) $f(4)$

i) Is f continuous @ $x=4$?
If Not, give reason

② The Tangent line to the function $y = f(x)$
@ the point $(1, -5)$ has slope $m = -3$

a) $f(1) =$

b) $f'(1) =$

c) write down the equation for the tangent line

For problems 3, 4, and 5 use Limit Laws to find the following limits. If the limit does not exist, say so. You must show work for credit. A table of values is NOT enough for credit.

③ $\lim_{x \rightarrow 3} \frac{x^2 - 2x - 3}{x - 3}$

$$\textcircled{4} \quad \lim_{x \rightarrow 0} \frac{|x|}{x}$$

Hint: use $|x| = \begin{cases} x & : \text{if } x \geq 0 \\ -x & : \text{if } x < 0 \end{cases}$

and compute left & right limits

$$\textcircled{5} \quad \lim_{x \rightarrow 5} \frac{\sqrt{x+4} - 3}{x-5}$$

⑥ Use the definition of $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$

to find $f'(x)$ for the function $f(x) = x^2 - 3x + 2$

⑦ Given $f(x) = 4x^3 - 6x^2 + 3x - 2$

Use the Intermediate Value Theorem to show that f has a root between 1 and 2.

Hint: (a) show/explain why f is continuous on $[1, 2]$

(b) show $f(1) < 0$ and $f(2) > 0$

(c) use the conclusion of IVT

BONUS Use the Squeeze Theorem to show the function

$$f(x) = \begin{cases} x^2 \sin \frac{1}{x} & \text{if } x \neq 0 \\ 0 & \text{if } x = 0 \end{cases} \quad \text{is continuous @ } x=0$$

