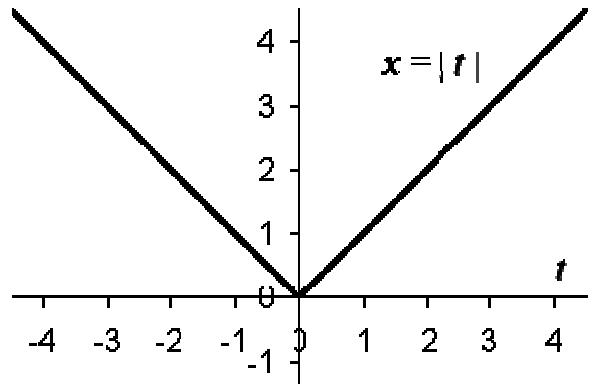


Math 124 Quiz #1

NAME _____

No books or notes allowed. Do not talk to, give help to, or receive help from others.
Give exact answers unless otherwise specified.

1 [4 points] An ant moves along the x -axis. Its position x (in inches) as a function of time t (in seconds) is given by $x = |t|$, as shown at the right.



(a) Place two dark dots on the graph so that the average velocity of the ant between those two times is -0.5 in/sec. Try to be precise.

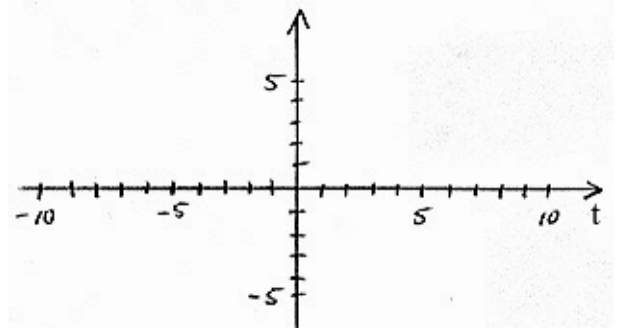
(b) The instantaneous velocity of the ant at $t = -2$ seconds is _____ in/sec.

2 [5 points] A skater rides his skateboard along a strip of sidewalk starting at $t = 1$ second. His position x (in feet) at time t (in seconds) is given by $x = \ln(t^3)$.

(a) His average velocity between $t = 1$ and $t = 3$ is _____ ft/sec.
Give 3 places of accuracy after the decimal point and show your work here:

(b) His instantaneous velocity at $t = 2$ seconds is approximately _____ ft/sec.
Give 3 places of accuracy after the decimal point and show your work here:

3 [3 points] Draw the graph of a single function $f(x)$ satisfying both $\lim_{x \rightarrow 3^+} f(x) = -2$ and $\lim_{x \rightarrow 3} f(x)$ does not exist. There are many possible correct graphs.



4 [8 points] Determine each of the limits. You must provide justification for each answer by either

- citing theorems from class (like Direct Substitution), or
- using the limit laws (which you do not have to cite, but you should only use one limit law per step), or
- justifying in detail why the limit does not exist.

Put a box around your final answer. Give exact answers for each.

(a) $\lim_{x \rightarrow 2} \frac{x^2 - 1}{x + 2}$

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

(c) $\lim_{x \rightarrow 0} \frac{\sqrt{x+4} - 2}{x}$