8. [9 points] Han is playing with a balloon. He blows it up and then lets it go without tying it and watches it fly straight upwards away from him. Let $B(t)$ be the distance, in inches, of the balloon from Han t seconds after he releases it. You may assume B is invertible on the interval shown below.

t (seconds)	0	0.2	0.6	0.8	0.9	1.2	1.4	1.6
$B(t)$ (inches)	0	0.6	1.0	1.4	1.8	2.4	2.8	3.1

a. [2 points] What is the average velocity of the balloon over the first 0.8 seconds of its flight? Show your work and include units.

Solution: Average velocity$=\dfrac{1.4-0}{0.8-0}=1.75$ inches per second.

b. [2 points] Estimate the instantaneous velocity of the balloon 1.45 seconds after Han releases it. Show your work and include units.

Solution:
Instantaneous velocity of the balloon at $t=1.45 \approx \dfrac{3.1-2.8}{1.6-1.4}=1.5$ inches per second.

c. [3 points] What is the average rate of change of B^{-1} over the interval $[0.6, 1.4]$? Show your work and include units.

Solution:
Average rate of change of B^{-1} over the interval $[0.6,1.4]=\dfrac{0.8-0.2}{1.4-0.6}=\dfrac{3}{4}$ seconds per inch.

d. [2 points] Over which of the following intervals could $B(m)$ be linear? Circle <u>all</u> possible intervals.

Solution:

$0 \le m \le 0.6$ $\quad$ $0.6 \le m \le 0.9$ $\quad$ $\boxed{0.9 \le m \le 1.4}$ $\quad$ $\boxed{1.4 \le m \le 1.6}$ $\quad$ NONE OF THESE