Name **Solutions**

MATH-1951
Quiz 1 - (2.1, 2.2)
Answer the following questions, and show your work. Scientific calculator only.

[1] (4 points total) If a rock is thrown upward on the planet Mars with a velocity of of 10 m/s, its height in meters t seconds later is given by $y = 10t - 1.86t^2$.

(a) (0.5 pt each) Find the average velocity over the given time intervals:

i) [1,2]

$$\text{average velocity} = \frac{\text{change in position}}{\text{time elapsed}} = \frac{(10 \cdot 2 - 1.86 \cdot 2^2) - (10 \cdot 1 - 1.86 \cdot 1^2)}{2 - 1}$$

$$= \frac{20 - 1.86 \cdot 4 - 10 + 1.86}{1} = 4.42 \; ^m/_s$$

ii) [1,1.5]

$$\text{average velocity} = \frac{(10 \cdot 1.5 - 1.86 \cdot 1.5^2) - (10 \cdot 1 - 1.86 \cdot 1^2)}{1.5 - 1} = 5.35 \; ^m/_s$$

iii) [1, 1.1]

$$\text{average velocity} = \frac{(10 \cdot 1.1 - 1.86 \cdot (1.1^2)) - (10 \cdot 1 - 1.86 \cdot 1^2)}{1.1 - 1} = 6.095 \; ^m/_s$$

iv) [1, 1.01]

$$\text{average velocity} = \frac{(10 \cdot 1.01 - 1.86 \cdot 1.01^2) - (10 \cdot 1 - 1.86 \cdot 1^2)}{1.01 - 1} = 6.2614 \; ^m/_s$$

v) [1, 1.001]

$$\text{average velocity} = \frac{(10 \cdot 1.001 - 1.86 \cdot 1.001^2) - (10 \cdot 1 - 1.86 \cdot 1^2)}{1.001 - 1} = 6.27814 \; ^m/_s$$

(b) (1.5 pt) Estimate the instantaneous velocity when $t = 1$.

Based on the above work, we estimate the instantaneous velocity when $t=1$ to be $6.28 \; ^m/_s$

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[2] (6 points total) Sketch the graph of an example of a
function f with domain $[-8, 0) \cup (0, 8]$ that satisfies all of the given conditions.

$$\lim_{x \to 2^-} f(x) = -2, \quad \lim_{x \to 2^+} f(x) = -1, \quad f(2) = 0, \quad \lim_{x \to -5} f(x) = \infty$$

Solutions may vary