

MATH 110 Problem Set 1.4

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The following problems based on Section 1.4 of the textbook will help you study. *You do not need to hand in solutions to these problems.*

1. (Based on 1.4.6) If a rock is thrown upward on the planet Mars with a velocity of 10 m/s, its height in meters t seconds later is given by $y = 10t - 1.86t^2$.

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

- | | | |
|----------------|-----------------|-----------------|
| i. $[1, 2]$ | iii. $[1, 1.1]$ | v. $[1, 1.001]$ |
| ii. $[1, 1.5]$ | iv. $[1, 1.01]$ | |

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

2. (Based on 1.4.4) The point $P(3, 1)$ lies on the curve $y = \sqrt{x-2}$.

(a) If Q is the point $(x, \sqrt{x-2})$, use your calculator to find the slope of the secant line PQ (correct to six decimal places) for the following values of x :

- | | | |
|----------|------------|---------|
| i. 2.9 | iii. 2.999 | v. 3.01 |
| ii. 2.99 | iv. 3.001 | vi. 3.1 |

(b) Using the results of part (a), guess the value of the slope of the tangent line to the curve at $P(3, 1)$.

You may find the following additional exercises from Section 1.4 helpful.

- 1.4 C-level: 1–2, 3–4, 5–6, 7–8;
B-level: 9