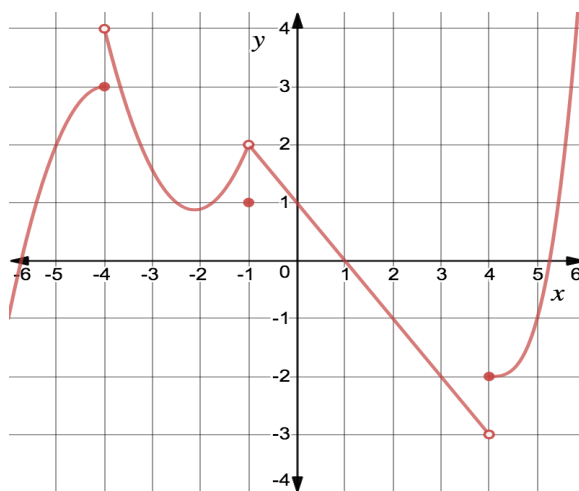Names: _____   Group #: _____

1. Find the average rate of change of the following functions over the given interval:

    (a) $f(x) = 3x^2 - 3x + 5; \; [-1, 2]$

    (b) $g(t) = 3\cos^2(t); \; \left[0, \dfrac{\pi}{6}\right]$

2. For the graph of $f(x)$ given below, find the following values, if they exist. If it does not exist, state "DNE".

(a) $f(-1)$

(b) $\displaystyle\lim_{x \to -1} f(x)$

(c) $f(4)$

(d) $\displaystyle\lim_{x \to 4^+} f(x)$

(e) $\displaystyle\lim_{x \to 4^-} f(x)$

(f) $\displaystyle\lim_{x \to 4} f(x)$

(g) $\displaystyle\lim_{x \to -4^-} f(x)$

(h) $\displaystyle\lim_{x \to -4} f(x)$

(i) $\displaystyle\lim_{x \to -5} f(x)$

3. If a rock is thrown upward on the planet Mars with a velocity of 20 m/s, its height in meters t seconds later is given by $s(t) = 20t - 2t^2$.

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

      i. $[1, 1.1]$

      ii. $[1, 1.01]$

      iii. $[1, 1.001]$

      iv. $[1, 1.0001]$

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

4. Complete the table given below for $f(x) = \dfrac{x^2 - 4}{x - 2}$, then make a conclusion on the given limits.

x	1.9	1.99	1.999	2.001	2.01	2.1
$f(x)$						

   (a) $\displaystyle\lim_{x \to 2^-} \dfrac{x^2 - 4}{x - 2}$

   (b) $\displaystyle\lim_{x \to 2^+} \dfrac{x^2 - 4}{x - 2}$

   (c) $\displaystyle\lim_{x \to 2} \dfrac{x^2 - 4}{x - 2}$

   (d) Why can't we just find $f(2)$ to determine $\displaystyle\lim_{x \to 2} f(x)$?