

# 1.8 – Approximating and Interpreting Instantaneous Rates of Change

## Terminology and Notation

The *derivative* of  $f$  at  $x = a$  is the instantaneous rate of change of  $f$  at  $x = a$ . The following notations are used for the derivative of  $f$  at  $x = a$ :

$$f'(a) \qquad \left. \frac{df}{dx} \right|_{x=a}$$

1. Use the given table to approximate the expressions below.

$x$	-2	-1	0	1	2
$f(x)$	-10	-7	0	2	6
$g(x)$	3	1	-4	-2	5

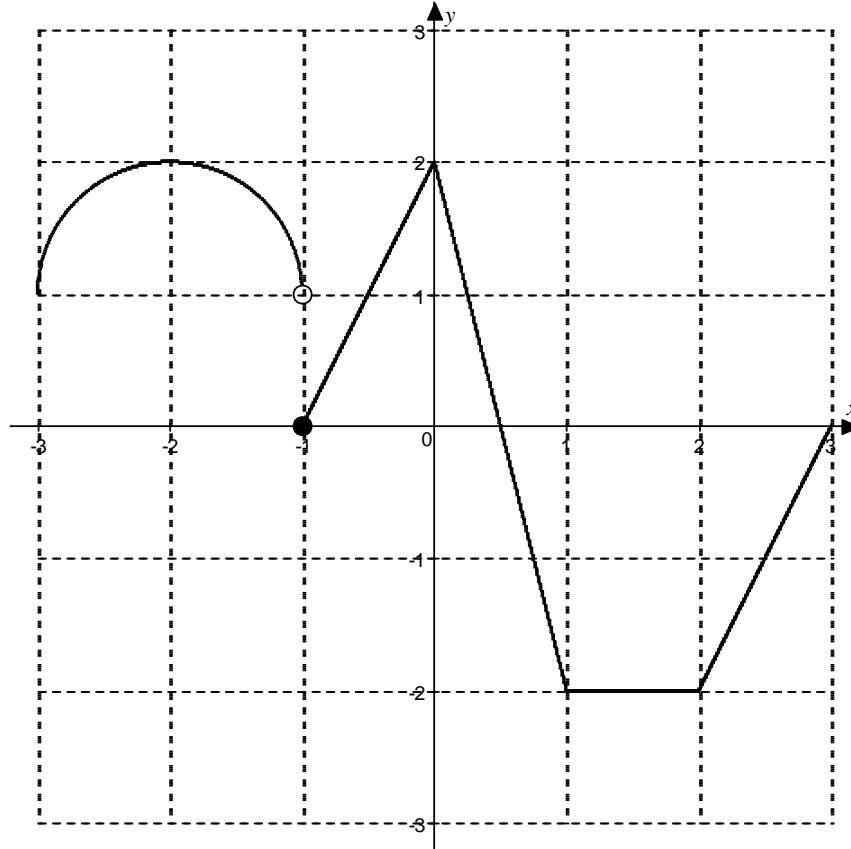
a.  $f'(-1)$

b.  $g'(2)$

c.  $-6g'(0.5)$

d.  $3g'(-1.5) - f'(-1.5)$

2. Use the graph of  $f$  below to evaluate or approximate (whichever is appropriate) each derivative.



a.  $f'(-2.5)$                       b.  $f'(-2)$                       c.  $f'(-1.5)$

d.  $f'(-1)$                               e.  $f'(-1/2)$                       f.  $f'(0)$

g.  $f'(1/2)$                               h.  $f'(3/2)$                               i.  $f'(2)$

3. Temperatures near Mars's northern pole were recorded during a balmy summer day. Approximate the rate of change of temperature at midnight given that the temperature was  $-176^{\circ}\text{F}$  at 10:00 PM and  $-183^{\circ}\text{F}$  at 1:00 AM. Interpret the meaning of your answer.

4. In preparation for the ensuing Clone Wars, Palpatine secretly sent word to Kamino, demanding an increase in clone production over the next year. The following table represents the number of clones  $C$ , measured in thousands, produced at time  $t$ , measured in months.

$t$	2	4	6	8	10	12
$C$	518	933	1351	1409	1663	2007

Approximate and interpret the meaning of  $C'(9)$ .