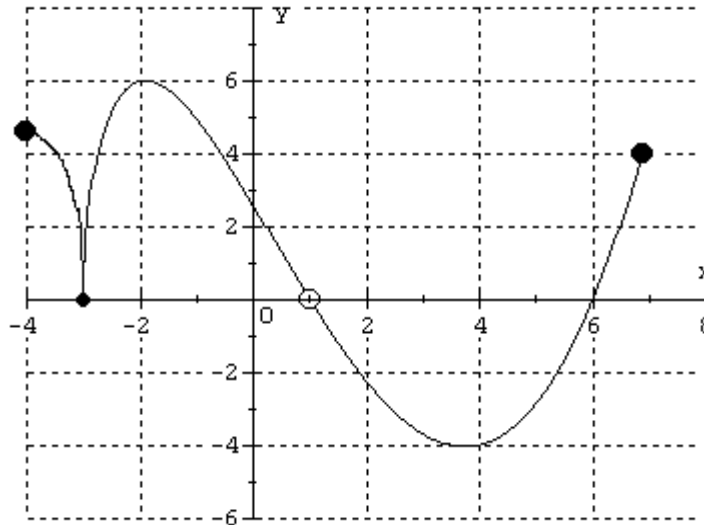


1. A function named  $f$  is graphed here.



By visually inspecting the graph of  $f$ , circle True or False for each of the following expressions.

True False i)  $f(2) > 0$

True False ii)  $f(-3) = 0$

True False iii)  $f_{[-4,1]} < 0$

True False iv)  $f_{[4,8]} > 0$

True False v)  $f'(-3) = 0$

True False vi)  $f'(6) > 0$

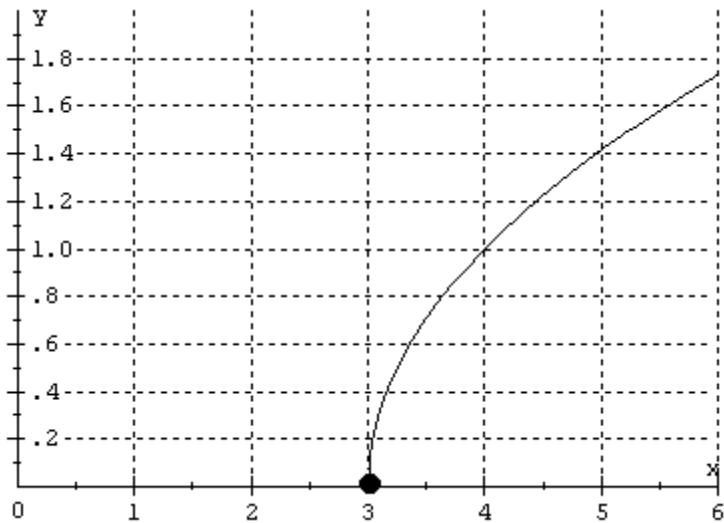
True False vii)  $f'(0) < 0$

True False viii)  $f(0.5) < 0$

True False ix)  $f(-2) < f(6)$

True False x)  $f'(-2) < f'(6)$

2. Consider the function  $f$  with input variable  $x$  and output variable  $y$  that is graphed here.

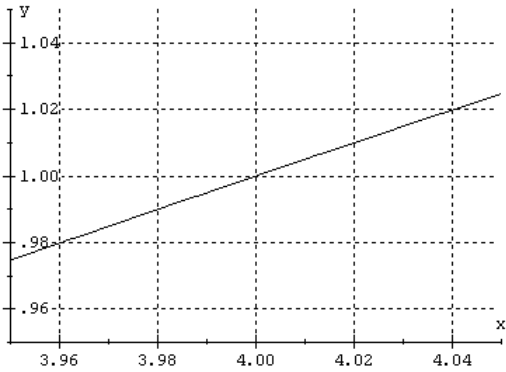


2a. Explain why  $f'(2)$  is undefined.

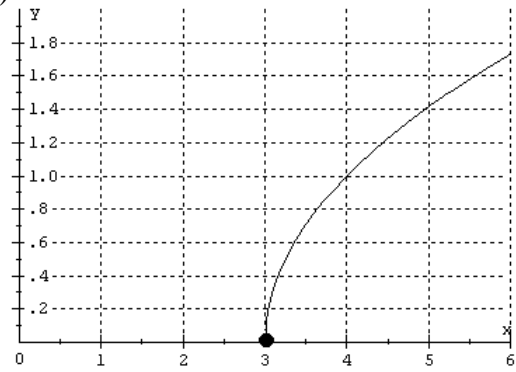
2b. Express the following value using function notation: The instantaneous rate of change of  $f$  at the input 4.

2c. Which of the following graphs i-iv of  $f$  can be used to most accurately estimate the instantaneous rate of change of  $f$  at the input 4?

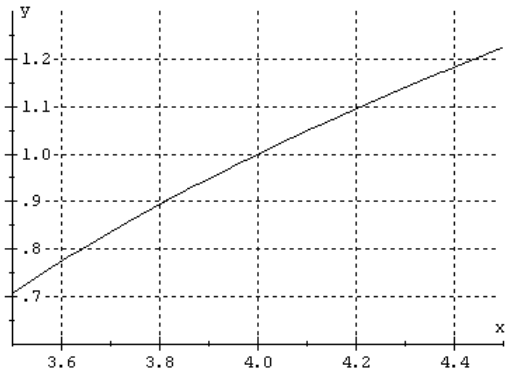
i)



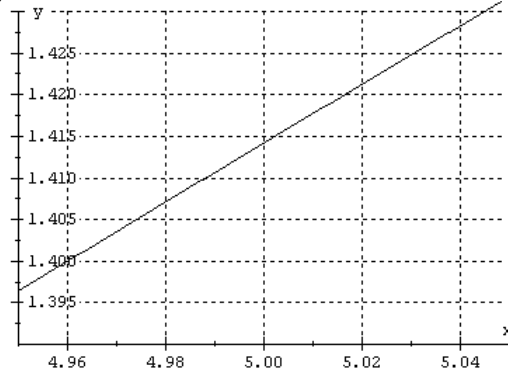
ii)



iii)



iv)

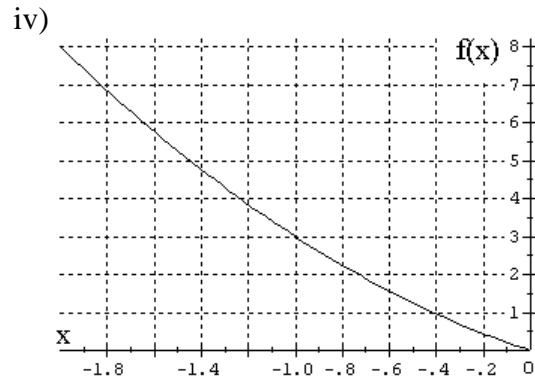
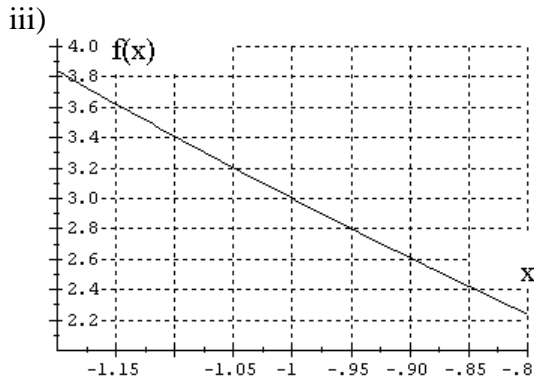
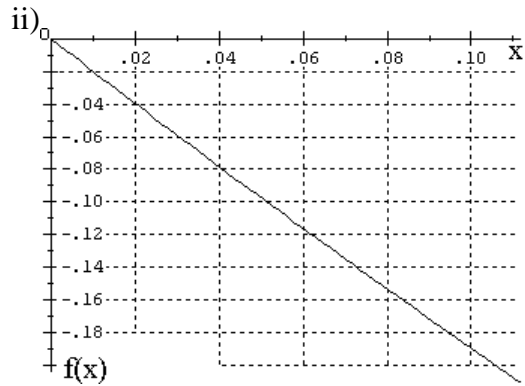
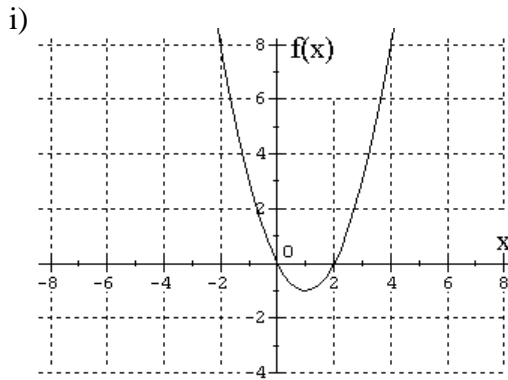


2d. Use your answer from part 2c to estimate the instantaneous rate of change of  $f$  at the input 4. *rate of change* =

3. Consider the function  $f(x) = x^2 - 2x$ .

3a. Express the following value using function notation: The instantaneous rate of change of  $f$  at the input  $-1$ .

3b. Which of the following graphs i-iv of  $f$  can be used to accurately estimate the instantaneous rate of change of  $f$  at the input  $-1$ ?



3c. Use your answer from part b to estimate the instantaneous rate of change of  $f$  at the input  $-1$ . *rate of change* =

4. Given the function  $f(x) = \frac{5x - x^2}{x - 2}$  :

4a. Complete the following table of values and then use the table to estimate

$f'(0) \approx$

$f_{[0, 0+1]}$ = _____
$f_{[0, 0+0.5]}$ = $-3$
$f_{[0, 0+0.1]}$ = $-2.579$
$f_{[0, 0+0.01]}$ = $-2.508$
$f_{[0, 0+0.001]}$ = $-2.501$

4b. What is the slope of the tangent line to the graph of  $f$  at the input  $x = 0$ ? Why?

5. Given the function  $f(x) = \frac{x^2 - 2x}{x - 5}$ :

5a. Complete the following table of values and then use the table to estimate

$f'(0) \approx$

$f_{[0, 0+1]} =$ _____
$f_{[0, 0+0.5]} = 0.333$
$f_{[0, 0+0.1]} = 0.388$
$f_{[0, 0+0.01]} = 0.398$
$f_{[0, 0+0.001]} = 0.399$

5b. What is the slope of the tangent line to the graph of  $f$  at the input  $x = 5$ ? Why?

6. Given the function  $f(x) = \frac{3x - x^2}{x - 2}$ :

6a. Complete the following table of values and then use the table to estimate

$\frac{df}{dx} \Big|_{x=0} \approx$

$f_{[0, 0+1]} =$ _____
$f_{[0, 0+0.5]} = -1.6667$
$f_{[0, 0+0.1]} = -1.5263$
$f_{[0, 0+0.01]} = -1.5025$
$f_{[0, 0+0.001]} = -1.5003$

6b. What is the slope of the tangent line to the graph of  $f$  at the input  $x = 0$ ? Why?

***MATH 2401 – Handout # 5***  
***Answers To Selected Odd-numbered Problems***

1. i. False; ii. True; iii. False; iv. False; v. False; vi. True; vii. True; viii. True; ix. False; x. True

3a.  $f'(-1)$

3b. graph iii

3c. -4

5a.  $f_{[0,1]} = 0.25$

5b.  $f'(0) \approx 4$