MA 181 Quiz #3 – Spring, 2010
Riseberg (25 points) Name Solutions

Show your work on the quiz paper. Full credit is not given unless the answer follows from the work shown.

1. (9 points)

(a) **Use the definition of the derivative** to find $f'(x)$ if $f(x)=\sqrt{x+3}$. No credit will be given if the definition of the derivative is not used.

$$f'(x)=\lim_{h\to 0}\frac{\sqrt{x+h+3}-\sqrt{x+3}}{h}$$

$$=\lim_{h\to 0}\frac{\sqrt{x+h+3}-\sqrt{x+3}}{h}\cdot\frac{\sqrt{x+h+3}+\sqrt{x+3}}{\sqrt{x+h+3}+\sqrt{x+3}}$$

$$=\lim_{h\to 0}\frac{x+h+3-(x+3)}{h(\sqrt{x+h+3}+\sqrt{x+3})}=\lim_{h\to 0}\frac{h}{h(\sqrt{x+h+3}+\sqrt{x+3})}$$

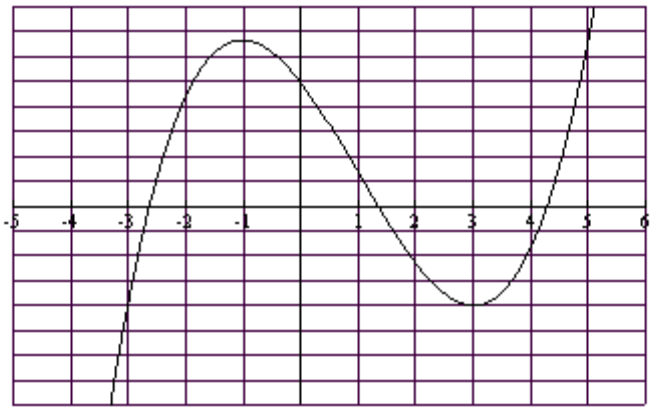
$$=\lim_{h\to 0}\frac{1}{(\sqrt{x+h+3}+\sqrt{x+3})}=\frac{1}{2\sqrt{x+3}}$$

(b) Use your answer to part (a) to find the slope of the tangent line to $f(x)=\sqrt{x+3}$ when x = 1 on the curve.

$$m=f'(1)=\frac{1}{2\sqrt{1+3}}=\frac{1}{2\sqrt{4}}=\frac{1}{4}$$

2. (4 points) The graph of a function $f(x)$ is shown. Arrange the following numbers in **increasing** order, from smallest to largest.

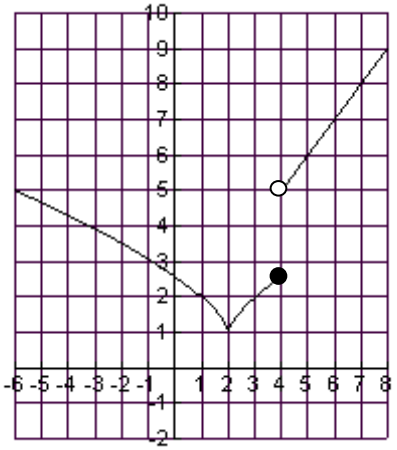
$f'(-3)$ $f'(-2$ $f)(1)$ $f'(3)$



$f'(1) < f'(3) < f'(-2) < f'(-3)$

OVER →

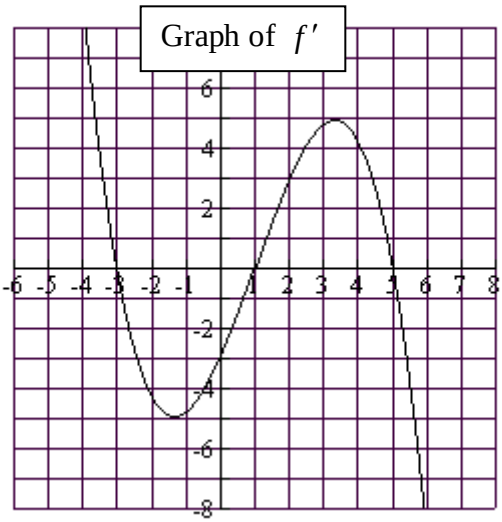
3. (3 points) The graph of a function g(x) is shown.



(a) List any value or values of x for which g is not continuous. x = 4

(b) List any value or values of x for which g is not differentiable. x = 2 and x = 4

4. (9 points) The graph of f', the derivative of a function f, is shown. If f' is defined for all x, use the graph of f' to answer the following questions about f. ***Note that the graph of f is <u>not</u> shown.***



(a) On what interval or intervals is f increasing?

$(-\infty,-3)$ *and* $(1,5)$

(b) On what interval or intervals is f decreasing?

$(-3,1)$ *and* $(5,\infty)$

(c) At what value or values of x, if any, does f have a local minimum?

x = 1

(d) At what value or values x, if any, does f have a local maximum?

x = -3 and x = 5