[ver:2D01566F.2] **NAME:** _____

Math 180 Hour Exam One

For every question, write your solution with computations in the exam booklet.
Each part of each problem is worth a certain number of points, indicated in the right margin.
There are a total of 100 points on this exam. Turn in this exam sheet with your booklet.

1. Evaluate the following limits.

   (a) $\lim_{x\to 2} \dfrac{x^2-6x+8}{x-2}$ [8 pts]

   (b) $\lim_{x\to 1} \dfrac{x^2-6x+8}{x-2}$ [8 pts]

2. Find the derivatives of the following functions using the basic rules. Leave your answers in an unsimplified form so that it is clear what method you used.

   (a) $x^5 + x^{-1/4} + 19$ [6 pts]

   (b) $(x^4 + x)e^x$ [6 pts]

   (c) $\dfrac{2x+1}{3x+2}$ [6 pts]

3. Find the equation of the tangent line to $y = 1 + \sqrt{x}$ at $x = 25$. [17 pts]

4. Find a specific value for δ such that, if $|x-3| < \delta$, then $|2x-6| < 0.01$. [16 pts]

5. Suppose that

$$f(4) = 4, \quad f'(4) = -2$$
$$g(4) = 5, \quad g'(4) = -3$$

   Find the derivative of the quotient function $\dfrac{f(x)}{g(x)}$ at $x = 4$. [17 pts]

6. The table below shows some values of a functions $f(x)$, $g(x)$, and $h(x)$ in the interval $1 \le x \le 3$.

x	1	1.5	2	2.5	3
$f(x)$	0.25	0.75	0.75	0.25	-0.75
$g(x)$	0.75	0.25	-0.25	-0.75	-1.25
$h(x)$	1.5	0.5	-0.5	-1.5	-2.5

   (a) Calculate the average rate of change of $f(x)$ on the interval $1 \le x \le 3$. [8 pts]

   (b) Which one of the functions g and h is the derivative of f? Explain your answer by citing some feature of the data. [8 pts]