Math 231 Test #1

Your Name:_____

Please circle your discussion group (2 pt)

1 Gan Yinliang B416	4 Zhang Jinghao B425	7 Loigen Sodian B416
2 Zhang Junwei B424	5 Xu Hang B419	
3 Ke Wentao B419	6 Huang Nuoer B410	

- You will have one hour for the exam.
- No notes, books or electronics during the exam.
- Do not open this test booklet until a proctor says start.
- For all free response questions, show work that justifies your answer.
- Raise your hand if you have a clarification question.
- Scratch paper is provided. You can ask for more if needed.
- Do not leave early: this disturbs others. If you finish your test early, check your work or just relax.
- Quit working when the test ends and hand your test booklet to proctors.

Question	1	2	3	4	5	6	7	8	9	Total
Points	12	10	10	10	12	8	16	10	10	98
Score										

1. (12 points, 3 points each) Determine whether the statement is true or false. Circle the right answer.

   (a) Suppose f is continuous on $[0, \infty)$, and $\lim_{x\to\infty} f(x) = 1$, $\int_0^\infty f(x)dx$ is convergent. (True or False)

   (b) Midpoint Rule is always more accurate than the trapezoidal rule. (True or False)

   (c) Since $\int_2^\infty \frac{dx}{\sqrt{x}}$ diverges, and $\frac{1}{\sqrt{x}} < \frac{1}{\sqrt{x-1}}$ for all $x > 2$, $\int_2^\infty \frac{dx}{\sqrt{x-1}}$ must diverge. (True or False)

   (d) If f is a positive function and $f'' < 0$ for $a \le x \le b$, show that $T_n < \int_a^b f(x)dx < M_n$. (True or False)

2. (10 points) Evaluate the following integral

$$\int t \sec^2 6t \ dt$$

3. (10 points) Evaluate the following integral

$$\int \sqrt{33 + 8x - x^2}\, dx$$

4. (10 points) Find the average value of $f(x) = 6x^2 \ln x$ on the interval [1,3].

5. (12 points) Evaluate the following integral

$$\int \frac{\sqrt{(1+\ln x)}}{xlnx} dx$$

6. (8 points) Write out the form of the partial fraction decomposition of the function. Do not determine the values of the coefficients. (the fractions need to be the most simple forms)

(a) $\frac{7x+1}{(x+1)^3(x^2+9)^2}$

(b) $\frac{x^4}{(x^3+x)(x^2-x+3)}$

7. (16 points) Determine whether the integral is convergent or divergent.

(a) $\int_{-\infty}^{20} re^{\frac{r}{4}} dr$

□ Convergent
□ Divergent

(b) $\int_{e}^{\infty} \frac{49}{x(\ln x)^3} dx$

□ Convergent
□ Divergent

(c) $\int_{2}^{3} \frac{8}{\sqrt{3-x}} dx$

□ Convergent
□ Divergent

(d) $\int_{0}^{3} \frac{1}{x\sqrt{x}} dx$

□ Convergent
□ Divergent

8. (10 points) Evaluate the integral

$$\int \frac{1}{sec\theta + 1} d\theta$$

9. (10 points) A particle moves on a straight line with velocity function $v(t) = sinwtcos^2wt$. Find its position function $s = f(t)$ if $f(0) = 0$.