Math 220 **Quiz 8 (take-home)** **Fall 2016**

Name _____

(circle your TA discussion section)

- ▷ **AD1**, TR 11:00-12:50, Andrew McConvey
- ▷ **AD2**, TR 9:00-10:50, Ben Wright
- ▷ **AD3**, TR 1:00-2:50, Cassie Christenson
- ▷ **ADA**, TR 8:00-8:50, Alexi Block Gorman
- ▷ **ADB**, TR 9:00-9:50, Dakota Ihli
- ▷ **ADC**, TR 10:00-10:50, Elizabeth Field
- ▷ **ADD**, TR 11:00-11:50, Adam Wagner
- ▷ **ADE**, TR 12:00-12:50, Adam Wagner
- ▷ **ADF**, TR 1:00-1:50, Tsutomu Okano
- ▷ **ADG**, TR 2:00-2:50, Xujun 'Henry' Liu
- ▷ **ADH**, TR 3:00-3:50, Mychael Sanchez
- ▷ **ADI**, TR 4:00-4:50, Mychael Sanchez
- ▷ **ADJ**, TR 9:00-9:50, Kyle Pratt
- ▷ **ADK**, TR 10:00-10:50, Kyle Pratt
- ▷ **ADL**, TR 11:00-11:50, Tigran Hakobyan
- ▷ **ADM**, TR 12:00-12:50, Liz Tatum
- ▷ **ADN**, TR 1:00-1:50, Xujun 'Henry' Liu
- ▷ **ADO**, TR 2:00-2:50, Tigran Hakobyan
- ▷ **ADP**, TR 3:00-3:50, Liz Tatum
- ▷ **ADQ**, TR 10:00-10:50, Dakota Ihli
- ▷ **ADR**, TR 9:00-9:50, Elizabeth Field
- ▷ **ADS**, TR 12:00-12:50, Tsutomu Okano
- ▷ **ADT**, TR 2:00-2:50, Anna Weigandt
- ▷ **ADU**, TR 3:00-3:50, Anna Weigandt

- You may work with other MATH 220 students. However each student should write up solutions separately and independently – nobody should copy someone else's work.
- You may use your notes, the textbook, or information found on my course home page.
- You may use a calculator only for basic arithmetic. In particular you should not use its graphing features.
- You are not allowed to search the Internet, use Wolfram Alpha, or use technology for anything beyond what is stated above.
- There is a higher expectation for the quality of your work on a take-home quiz. Everything should be written logically and legibly with sufficient work to justify each answer. Blank copies of the quiz are available on the course home page.
- Be sure that the pages are nicely stapled – do not just fold the corners.
- **The quiz is due at the beginning of your official discussion period on Tuesday, November 1.**
- **Note to TAs and Tutors – you should not help students with these specific problems until all discussion sections have turned in the quiz.**

1. (2 points) Find a formula for $f(\theta)$ given that $f''(\theta) = 3\sin\theta - 5\cos\theta$, $f(0) = 13$ and $f(\pi) = 4\pi + 3$.

2. (2 points) Suppose that $w(x)$ is continuous at all real numbers and satisfies the following equations.

   - $\int_2^8 w(x)\,dx = 30$
   - $\int_6^{10} w(x)\,dx = -15$
   - $\int_8^{10} w(x)\,dx = 5$

   What is the value of $\int_2^6 (4w(x) + 25)\ dx$?

3. (2 points) Evaluate the following limit. Use proper notation throughout your evaluation of this limit.

$$\lim_{n\to\infty} \sum_{k=1}^{n} \frac{24k^2 - 3n^2 + 20k}{n^3}$$

4. (2 points) From section 5.2 we have the following property of definite integrals.

   - If $f(x)$ is continuous and $m \leq f(x) \leq M$ for $a \leq x \leq b$, then $m(b-a) \leq \int_a^b f(x)\,dx \leq M(b-a)$

   Use this property to carefully explain why the following inequality holds.

$$0.2 \leq \int_9^{13} \frac{1}{3\sin^4(x^{12}) + \cos^8(x^5) + 16}\,dx \leq 0.25$$

5. (2 points) The area between the x-axis and the graph of $f(x) = 4x \ln x$ on the interval $[6, 10]$ can be written as a limit of Riemann sums in many different ways. I have shown how to do this for two of the six ways indicated below. Fill in the missing information for the remaining limits so that the only variables appearing are n and k. Do not evaluate these limits.

(a) Using a limit of right Riemann sums,

$$AREA = \lim_{n\to\infty} \sum_{k=1}^{n} \left[4\left(6 + k \cdot \frac{4}{n}\right) \ln\left(6 + k \cdot \frac{4}{n}\right) \cdot \frac{4}{n} \right]$$

(b) Using a limit of right Riemann sums,

$$AREA = \lim_{n\to\infty} \sum_{k=0}^{n-1} \left[\qquad \right]$$

(c) Using a limit of left Riemann sums,

$$AREA = \lim_{n\to\infty} \sum_{k=1}^{n} \left[\qquad \right]$$

(d) Using a limit of left Riemann sums,

$$AREA = \lim_{n\to\infty} \sum_{k=0}^{n-1} \left[\qquad \right]$$

(e) Using a limit of midpoint Riemann sums,

$$AREA = \lim_{n\to\infty} \sum_{k=1}^{n} \left[\qquad \right]$$

(f) Using a limit of midpoint Riemann sums,

$$AREA = \lim_{n\to\infty} \sum_{k=0}^{n-1} \left[4\left(6 + (k+0.5) \cdot \frac{4}{n}\right) \ln\left(6 + (k+0.5) \cdot \frac{4}{n}\right) \cdot \frac{4}{n} \right]$$