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

Name ________________________________

(circle your TA discussion section)

- ▷ **AD1**, TR 9:00-10:50, Hannah Burson
- ▷ **AD2**, TR 1:00-2:50, Cassie Christenson
- ▷ **ADA**, TR 8:00-8:50, Iftikhar Ahmed
- ▷ **ADB**, TR 9:00-9:50, Iftikhar Ahmed
- ▷ **ADC**, TR 10:00-10:50, Elizabeth 'Liz' Tatum
- ▷ **ADD**, TR 11:00-11:50, Elizabeth 'Liz' Tatum
- ▷ **ADE**, TR 12:00-12:50, Emily Heath
- ▷ **ADF**, TR 1:00-1:50, Emily Heath
- ▷ **ADG**, TR 2:00-2:50, Dara Zirlin
- ▷ **ADH**, TR 3:00-3:50, Dara Zirlin
- ▷ **ADJ**, TR 9:00-9:50, Xujun 'Henry' Liu
- ▷ **ADK**, TR 10:00-10:50, Xujun 'Henry' Liu
- ▷ **ADL**, TR 11:00-11:50, Jooyeon 'Jane' Chung
- ▷ **ADM**, TR 12:00-12:50, Jooyeon 'Jane' Chung
- ▷ **ADN**, TR 1:00-1:50, Xiaolong 'Hans' Han
- ▷ **ADO**, TR 2:00-2:50, Martino Fassina
- ▷ **ADP**, TR 3:00-3:50, Martino Fassina
- ▷ **ADQ**, TR 4:00-4:50, Xiaolong 'Hans' Han

- 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, April 5.**
- **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 $f(x)$ given that $f''(x) = 2\cos x + 5\sin x$, $f(0) = 10$ and $f(\pi/2) = \pi + 7$.

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

- $\int_2^5 p(x)\,dx = 4$
- $\int_2^{10} p(x)\,dx = 13$
- $\int_{10}^{25} p(x)\,dx = 61$
- $\int_{20}^{25} p(x)\,dx = 36$

What is the value of $\int_5^{20} (3p(x) - 4)\ dx$?

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

$$\lim_{n\to\infty} \sum_{k=1}^{n} \frac{(3k+2n)^2}{n^3}$$

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

$$\boxed{\text{If } f(x) \text{ is continuous and } m \le f(x) \le M \text{ for } a \le x \le b, \text{ then } m(b-a) \le \int_a^b f(x)\,dx \le M(b-a)}$$

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

$$0.6 \le \int_{-1}^{2} \frac{1}{\sqrt{17+x^3}}\,dx \le 0.75$$

5. (2 points) The area between the x-axis and the graph of $f(x) = \dfrac{1}{x^3+2}$ on the interval $[6, 11]$ 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,

$$AREA = \lim_{n\to\infty} \sum_{k=1}^{n} \left[\frac{1}{\left(6 + k \cdot \frac{5}{n}\right)^3 + 2} \cdot \frac{5}{n} \right]$$

(b) Using a limit of right Riemann sums,

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

(c) Using a limit of left Riemann sums,

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

(d) Using a limit of left Riemann sums,

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

(e) Using a limit of midpoint Riemann sums,

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

(f) Using a limit of midpoint Riemann sums,

$$AREA = \lim_{n\to\infty} \sum_{k=0}^{n-1} \left[\frac{1}{\left(6 + (k+0.5) \cdot \frac{5}{n}\right)^3 + 2} \cdot \frac{5}{n} \right]$$