Math 220 **Quiz 8 (take-home)** **Fall 2014**

Name ____________________________________

(circle your TA discussion section)

- ▷ **AD1**, TR 11:00-12:50, Melinda Lanius
- ▷ **AD2**, TR 9:00-10:50, Ben Fulan
- ▷ **AD3**, TR 1:00-2:50, Mychael Sanchez
- ▷ **ADA**, TR 8:00-8:50, Derek Jung
- ▷ **ADB**, TR 9:00-9:50, Derek Jung
- ▷ **ADC**, TR 10:00-10:50, Andrew McConvey
- ▷ **ADD**, TR 11:00-11:50, Andrew McConvey
- ▷ **ADE**, TR 12:00-12:50, David Poole
- ▷ **ADF**, TR 1:00-1:50, Alonza Terry
- ▷ **ADG**, TR 2:00-2:50, Alonza Terry
- ▷ **ADH**, TR 3:00-3:50, Argen West
- ▷ **ADI**, TR 4:00-4:50, Argen West
- ▷ **ADJ**, TR 9:00-9:50, Vanessa Rivera-Quiñones
- ▷ **ADK**, TR 10:00-10:50, Vanessa Rivera-Quiñones
- ▷ **ADL**, TR 11:00-11:50, David Poole
- ▷ **ADM**, TR 12:00-12:50, Iftikhar Ahmed
- ▷ **ADN**, TR 1:00-1:50, Kaiwen Liu
- ▷ **ADO**, TR 2:00-2:50, Hannah Burson
- ▷ **ADP**, TR 3:00-3:50, Hannah Burson
- ▷ **ADR**, TR 9:00-9:50, Stephen Berning
- ▷ **ADS**, TR 12:00-12:50, Sarah Mousley
- ▷ **ADT**, TR 2:00-2:50, Kaiwen Liu
- ▷ **ADU**, TR 3:00-3:50, Iftikhar Ahmed

- 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 lecture period on Monday, November 3.**
- **Note to TAs and Tutors – you should not help students with these specific problems or go over solutions until after 5pm Monday.**

1. (2 points) Find a formula for $g(r)$ given that $g''(r) = \frac{6r^3 + 8r^2 + 1}{r^2}$, $g(1) = 8$ and $g'(1) = 25$.

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

- $\int_0^8 p(x)\,dx = 20$
- $\int_0^2 p(x)\,dx = 6$
- $\int_5^2 p(x)\,dx = 10$

What is the value of $\int_5^8 (3p(x) - 2)\,dx$?

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

$$\lim_{n \to \infty} \sum_{k=1}^{n} \frac{5k^2 - 6kn + 2n^2 - 4}{n^3}$$

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.

$$4.8 \leq \int_1^9 \frac{3}{\sqrt{1+8\sqrt{x}}}\,dx \leq 8$$

5. (2 points) At time t seconds, the velocity of an object is $t^2 + 8t$ m/s. The distance in meters traveled by this object from $t = 5$ to $t = 9$ 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,

$$DISTANCE = \lim_{n\to\infty} \sum_{k=1}^{n} \left[\left(\left(5 + k \cdot \frac{4}{n}\right)^2 + 8\left(5 + k \cdot \frac{4}{n}\right) \right) \cdot \frac{4}{n} \right]$$

(b) Using a limit of right Riemann sums,

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

(c) Using a limit of left Riemann sums,

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

(d) Using a limit of left Riemann sums,

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

(e) Using a limit of midpoint Riemann sums,

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

(f) Using a limit of midpoint Riemann sums,

$$DISTANCE = \lim_{n\to\infty} \sum_{k=0}^{n-1} \left[\left(\left(5 + (k + 0.5) \cdot \frac{4}{n}\right)^2 + 8\left(5 + (k + 0.5) \cdot \frac{4}{n}\right) \right) \cdot \frac{4}{n} \right]$$