Math 220 **Quiz 8 (take-home)** **Spring 2017**

Name ____________________________________

(circle your TA discussion section)

- ▷ **AD1**, TR 9:00-10:50, Andrew McConvey
- ▷ **AD2**, TR 1:00-2:50, Sarah Loeb
- ▷ **ADA**, TR 8:00-8:50, Christopher Linden
- ▷ **ADB**, TR 9:00-9:50, Dakota Ihli
- ▷ **ADC**, TR 10:00-10:50, Cassie Christenson
- ▷ **ADD**, TR 11:00-11:50, Daulet Dyussekenov
- ▷ **ADE**, TR 12:00-12:50, Daulet Dyussekenov
- ▷ **ADF**, TR 1:00-1:50, Cassie Christenson
- ▷ **ADG**, TR 2:00-2:50, Xinghua Gao
- ▷ **ADH**, TR 3:00-3:50, Xinghua Gao
- ▷ **ADJ**, TR 9:00-9:50, Lan Wang
- ▷ **ADK**, TR 10:00-10:50, Lan Wang
- ▷ **ADO**, TR 2:00-2:50, Christopher Linden
- ▷ **ADQ**, TR 4:00-4:50, Dakota Ihli

- 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 4.**
- **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 one function $p(x)$ which satisfies all three of the following conditions.

- $p(1) = 14$
- $p'(1) = -9$
- $p''(x) = \dfrac{\left(6x^2 + \sqrt{x}\,\right)^2}{x^3}$

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

- $\displaystyle\int_{-2}^{5} g(x)\,dx = 7$
- $\displaystyle\int_{1}^{15} g(x)\,dx = 2$
- $\displaystyle\int_{-2}^{15} g(x)\,dx = 12$

What is the value of $\displaystyle\int_{1}^{5} (9 - 2g(x))\ dx$?

3. (2 points) Evaluate the following limit. Use proper notation in each step.

$$\lim_{n\to\infty} \sum_{k=1}^{n} \frac{20n^3 + 12nk^2 + 36n^2k + 9}{n^4}$$

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.

$$0.42 \leq \int_1^{22} \frac{1}{\sqrt{1600\cos^2(x) + 900}}\,dx \leq 0.7$$

5. (2 points) At time t seconds, the velocity of an object is $v(t) = 6t + 5\ m/s$. The distance in meters traveled by this object from $t = 4$ to $t = 7$ 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 midpoint Riemann sums,

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

(b) Using a limit of left Riemann sums,

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

(c) Using a limit of right Riemann sums,

$$DISTANCE = \lim_{n\to\infty} \sum_{k=1}^{n} \left[\left(6 \left(4 + k \cdot \frac{3}{n} \right) + 5 \right) \cdot \frac{3}{n} \right]$$

(d) Using a limit of midpoint Riemann sums,

$$DISTANCE = \lim_{n\to\infty} \sum_{k=0}^{n-1} \left[\left(6 \left(4 + (k + 0.5) \cdot \frac{3}{n} \right) + 5 \right) \cdot \frac{3}{n} \right]$$

(e) Using a limit of left Riemann sums,

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

(f) Using a limit of right Riemann sums,

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