Name: ______________________________

Math 1152Q: Fall '17
Week 7 Sample Quiz

Summary:

- apply partial fraction decomposition to rational function (with denominators that have deg 2 or 3);
- determine whether an improper integral diverges or converges; evaluate the convergent integral;
- know whether the condition for the Integral Test applies (when the function is continuous, positive, and decreasing on the interval $[c, \infty]$);
- use the Integral Test to determine whether a series diverges or converges.

1. (Optional Bonus, for an extra token) Write 10 or more distinct (correctly spelled) first names of students who are present during the quiz (whose name is not the same as your name) and be able to match names to faces. Each incorrect name would negate a correct name.

   Example: 'write the first names of the students who are currently sitting in the middle row'.

2. (Section 7.4 WebAssign)
   (a) Evaluate $\int \frac{10}{(x+5)(x-2)}$ dx
   (b) Evaluate $\int \frac{x+4}{x^2+2x+5}$ dx
   (c) Evaluate $\int \frac{7x^2-6x+16}{x^3+4x}$ dx

3. (Section 7.8 WebAssign)
   (a) Find the values of p for which the integral $\int_e^\infty \frac{6}{x(\ln x)^p}$ dx converges. Evaluate the integral for these values of p.
   (Hint: u-substitution. Check what happens when $p = 1$, when $p < 1$, and when $p > 1$.)
   (b) Determine whether
   $$\int_2^\infty \left(\frac{1}{e^5}\right)^x \text{ dx}$$
   is convergent or divergent. If it is convergent, evaluate it.
   (c) Determine whether
   $$\int_2^\infty \frac{1}{x^2+8x-9} \text{ dx}$$
   is convergent or divergent. If it is convergent, evaluate it.
   (d) Determine whether
   $$\int_0^1 \frac{4}{x^5} \text{ dx}$$
   is convergent or divergent. If it is convergent, evaluate it.
   (e) Determine whether
   $$\int_0^1 \frac{4}{x^{0.5}} \text{ dx}$$
   is convergent or divergent. If it is convergent, evaluate it.
   (f) Determine whether
   $$\int_2^3 \frac{2}{\sqrt{3-x}} \text{ dx}$$
   is convergent or divergent. If it is convergent, evaluate it.

4. (Section 11.3 WebAssign)

(a) Evaluate the integral

$$\int_1^\infty \frac{3}{x^6}\ \mathrm{dx}.$$

Are the conditions for the Integral Test satisfied? If so, use the Integral Test to determine whether the series

$$\sum_1^\infty \frac{3}{n^6}$$

is convergent or divergent.

(b) Evaluate the integral

$$\int_1^\infty \frac{1}{(4x+2)^3}\ \mathrm{dx}.$$

Are the conditions for the Integral Test satisfied? If so, use the Integral Test to determine whether the series

$$\sum_1^\infty \frac{1}{(4n+2)^3}$$

is convergent or divergent.

(c) Evaluate the integral

$$\int_1^\infty \frac{1}{\sqrt{x+9}}\ \mathrm{dx}.$$

Are the conditions for the Integral Test satisfied? If so, use the Integral Test to determine whether the series

$$\sum_1^\infty \frac{1}{\sqrt{n+9}}$$

is convergent or divergent.

(d) Evaluate the integral

$$\int_1^\infty x\ e^{-9x}\ \mathrm{dx}.$$

Are the conditions for the Integral Test satisfied? If so, use the Integral Test to determine whether the series $\sum_1^\infty ne^{-9n}$ is convergent or divergent.

(e) Evaluate the integral

$$\int_1^\infty x\ e^{-9x}\ \mathrm{dx}$$

Are the conditions for the Integral Test satisfied? If so, use the Integral Test to determine whether the series

$$\sum_1^\infty ne^{9n}$$

is convergent or divergent.

(f) Are the conditions for the Integral Test satisfied for the series

$$\sum_1^\infty (\cos\ n)^2\ +\ \frac{1}{n}\ \mathrm{dx}\ \ ?$$

(g) Are the conditions for the Integral Test satisfied for the series

$$\sum_1^\infty \frac{(\cos\ n)^2}{n}\ \mathrm{dx}\ \ ?$$