Math 221 Calculus 2 — Midterm Exam 3
Professor John Maginnis — April 4, 2017

Your name: ______________________________

Rec. Instr.: ______________________________ Rec. Time: __________________

Show all your work in the space provided under each question. Please write neatly and present your answers in an organized way. You may use your one sheet of notes, but no books or calculators. This exam is worth 60 points. The chart below indicates how many points each problem is worth.

Problem	1	2	3	4
Points	/4	/10	/12	/12
Problem	5	6		Total
Points	/12	/10		/60

1. Determine whether the sequence converges (compute a limit).

$$a_n = \frac{2n^2 - 1}{3n^2 + 5}$$

2. Determine whether the series converges; list each test of convergence used.

(a)

$$\sum_{n=0}^{\infty} \frac{3^n}{n!}$$

(b)

$$\sum_{n=1}^{\infty} \left(\frac{n+1}{2n} \right)^{3n}$$

3. Determine whether the series converges; list each test of convergence used.

(a)

$$\sum_{n=1}^{\infty} \frac{\sin(n)}{n^3}$$

(b)

$$\sum_{n=2}^{\infty} \frac{2^n}{e^n - 3}$$

4. Determine whether the series converges; list each test of convergence used.

(a)

$$\sum_{n=3}^{\infty} \frac{\ln(n)}{n}$$

(b)

$$\sum_{n=2}^{\infty} \left(1 - \frac{1}{n}\right)^{n}$$

5. Find the interval of convergence of the power series.

$$\sum_{n=1}^{\infty} \frac{x^n}{\sqrt{n}}$$

6. (a) Use the remainder estimate for alternating series to find the number N such that the series is approximated by the partial sum S_N with accuracy within $.001 = \frac{1}{1000}$.

$$\sum_{n=1}^{\infty} \frac{(-1)^n}{n^{3/2}}$$

(b) Use the remainder estimate for the integral test to find the number N such that the series is approximated by the partial sum S_N with accuracy within $.001 = \frac{1}{1000}$.

$$\sum_{n=1}^{\infty} \frac{1}{n^{3/2}}$$