Math 1297, Calculus II
Lecture Section 8 (Discussion sections 12-15)
Test 3 Practice Problems answers

1. see p. 239
2. $s_n \to 10$ where $s_n = a_1 + a_2 + ... + a_n$.
3. (a) Converges (absolutely); p-series with $p = 3/2$.
   (b) Converges conditionally; Alternating series theorem; p-series with $p = 1/2$.
   (c) Converges (absolutely); limit comparison test with $\sum \frac{1}{n^2}$
   (d) Converges (absolutely); ratio test: $\frac{|a_{n+1}|}{|a_n|} \to 1/e < 1$
4. No conclusion.
5. (a) $(-\infty, \infty)$ (Use ratio test.)
   (b) $[-\frac{2}{3}, 0)$
6. (a) $a_n = \frac{1}{4}(\frac{x}{4})^n$; r=4.
   (b) $3 + x + \frac{x^5}{5} + \frac{x^9}{9} + ...$ ($a_n = \frac{x^{4n-3}}{4n-3}$ for $n \geq 1$); $r = 1$ (same radius as the series before integration: $|x^4| < 1$, or do the ratio test)
7. $1 - 1(x-1) + (x-1)^2 - (x-1)^3$
8. (a) 10
   (b) 0
9. (a) True. Justification: x=3 is closer to the point of expansion (x=2) than is x=0. Further explanation but more than is required for the "brief explanation": If a power series converges at any value, it must converge for any value closer to the point of expansion.
   (b) False; one counterexample is $a_n = \frac{1}{n^2}, b_n = \frac{1}{n}$
10. $1+2x+2x^2+\frac{4}{3}x^3+\frac{2}{3}x^4+...$ (The first FIVE power series coefficients are $1, 2, 2, 4/3, 2/3$).
11. $N > 99$ (Use the alternating series error bound: the error is less than the size of the first omitted term.)
12. $a = -.1$ ("M" in the Taylor remainder formula for $R_n(x)$ is the max of the third derivative of e^x for x between a and 0. Note that a is negative. Since e^x is increasing, its max is at the right hand endpoint, zero. The value of the max is $e^0 = 1$.)
13. See p. 767, part i
14. Lots of possibilities. The easiest two are perhaps the two circles centered at the origin and of radius 1 (level 1), and 2 (level 4).