Fall 2005 Math 152
Exam 3 Review Exercises - Solutions

1. a.) Converges to 0

   b.) Converges to 3

   c.) Converges to $\frac{\pi}{2}$

   d.) Converges to 0

2. a.) $\sin(1) + \sin(\frac{1}{2})$

   b.) 1

   c.) 2

   d.) $\frac{16}{5}$

   e.) diverges

   f.) $\frac{10}{3}$

3. $a_n = \frac{2}{n(n+1)}$, $\sum_{n=1}^{\infty} a_n = 1$

4. a.) Diverges by the Integral Test

   b.) Diverges by Limit Comparison Test

   c.) Converges by Ratio Test

   d.) Converges by Ratio Test

   e.) Diverges by Test for Divergence

   f.) Converges by Alternating Series Test

5. a.) Converges, but not absolutely

   b.) Converges absolutely.

   c.) Converges absolutely

   d.) Converges absolutely

6. $s_{10} = \frac{1}{2(\ln 2)^3} + \frac{1}{3(\ln 3)^3} + ... + \frac{1}{10(\ln 10)^3}$

   $R_{10} \leq \frac{1}{2(\ln 10)^2}$

7. a.) $s_5 = -1 + \frac{1}{2^5} - \frac{1}{3^5} + \frac{1}{4^5} - \frac{1}{5^5}$

   b.) $|R_5| \leq \frac{1}{6^5}$

8. $n = 4$, therefore you will need to use s_4 which has 5 terms.

9. a.) $R = \frac{1}{\pi}$, $I = [\frac{-1}{\pi}, \frac{1}{\pi}]$

   b.) $R = \infty$, $I = (-\infty, \infty)$

   c.) $R = 0$, $I = \{-2\}$

   d.) $R = 1$, $I = (0, 2]$

10. a.) The series will diverge at $x = 8$.

    b.) The series will converge at $x = -3$.

    c.) Nothing can be said about convergence at $x = -4$.

    d.) Nothing can be said about convergence at $x = 5$.

11. a.) $\sum_{n=0}^{\infty} x^n$, $R = 1$

    b.) $\sum_{n=0}^{\infty} \frac{(-1)^n x^{2n}}{4^{n+1}}$, $R = 2$

    c.) $\ln 2 - \sum_{n=0}^{\infty} \frac{x^{n+1}}{(n+1)2^{n+1}}$, $R = 2$

    d.) $\sum_{n=0}^{\infty} \frac{(-1)^n x^{2n}}{2n+1}$, $R = 1$

    e.) $\sum_{n=1}^{\infty} \frac{1}{2}(-1)^{n+1} 2nx^{2n-1}$, $R = 1$

12. $\sum_{n=0}^{\infty} \frac{(-1)^n (0.5)^{4n+1}}{4n+1}$

13. $\sum_{n=0}^{\infty} \frac{4^n (x+1)^n}{e^4 n!}$

14. $\frac{1}{9} - \frac{2}{27}(x-3) + \frac{1}{27}(x-3)^2$

15. $C + \sum_{n=0}^{\infty} \frac{(-1)^n x^{4n}}{(2n)!(4n)}$

16. $\sum_{n=0}^{\infty} \frac{(-1)^n}{(2n+1)n!}$; $s_1 = \frac{2}{3}$, $|R_1| < 0.1$

17. $\frac{1}{512}$

18. $\frac{1}{5!} - \frac{x^2}{7!} + \frac{x^4}{9!} - \frac{x^6}{11!}$

19. a.) $T_4(x) = \frac{1}{2} - \frac{1}{2}(x-2) + \frac{3}{8}(x-2)^2 - \frac{1}{4}(x-2)^3 + \frac{5}{32}(x-2)^4$. $R_4(x) = \frac{2}{x^2} - T_4(x)$

b.) $Error \leq 12.$

20. a.) $T_2(x) = \sqrt{2} + \frac{1}{2\sqrt{2}}(x-1) - \frac{1}{16\sqrt{2}}(x-1)^2$

$R_2(x) = \sqrt{1+x} - T_2(x)$

b.) $Error \leq .0625$ or $\frac{1}{16}$