Math 2320 - Review for Test 2

To prepare for the test you should complete the Quizzes, the homework and here are some sample problems.

1 Integrals

1. $\displaystyle\int \frac{1}{\sqrt{x^2-4}}\,dx$
2. $\displaystyle\int \frac{1}{\sqrt{x^2+1}}\,dx$
3. $\displaystyle\int \frac{1}{(3-x^2)^{3/2}}\,dx$
4. $\displaystyle\int \sqrt{x^2-1}\,dx$
5. $\displaystyle\int \frac{1}{\sqrt{x^2+2x}}\,dx$ Hint: Try $u = x+1$ and then use a trig substituion, since $x^2+2x = x^2+2x+1-1 = (x+1)^2-1$.
6. $\displaystyle\int \frac{3x^3-4x+2}{x^3-2x^4}\,dx$
7. $\displaystyle\int \frac{1}{x^4-1}\,dx$
8. $\displaystyle\int \frac{x^3+5x^2+10x+11}{(x+1)^2(x^2+4)}\,dx$
9. $\displaystyle\int_0^1 \ln(x)\,dx$
10. $\displaystyle\int_0^\infty \frac{1}{x^2}\,dx$
11. $\displaystyle\int_0^1 \frac{1}{x^2}\,dx$
12. $\displaystyle\int_0^\infty \frac{1}{x^2+1}\,dx$

2 Limits of Sequences

13. Compute the limit of the following. If no nth term formula is goven first find the formula and then compute the limit.

    (a) $-1, 1, -1, 1, -1, 1, \ldots$

    (b) $1 - \frac{1}{1}, 1 - \frac{1}{2}, 1 - \frac{1}{3}, 1 - \frac{1}{4}, 1 - \frac{1}{5}, \ldots$

    (c) $3, 6, 12, 24, 48, 96, \ldots$

    (d) $-\frac{1}{2}, \frac{1}{3}, -\frac{1}{4}, \frac{1}{5}, -\frac{1}{6}, \ldots$

    (e) $\lim_{n\to\infty} \frac{1}{n}$

    (f) $\lim_{n\to\infty} (1 + \frac{1}{n})^n$

    (g) $\lim_{n\to\infty} (1 + \frac{1}{n^2})^n$

    (h) $\lim_{n\to\infty} (1 + \frac{1}{n^2})^{n^2}$

    (i) $\lim_{n\to\infty} (1 + \frac{1}{n^2})^{n^3}$

    (j) $\lim_{n\to\infty} (1 - \frac{1}{n^2})^{n^3}$

    (k) $\lim_{n\to\infty} \frac{\ln(\frac{1}{n}}{n}$

    (l) $\lim_{x\to 0} \frac{1}{x}$

    (m) $\lim_{x\to 0^+} \frac{1}{x}$

    (n) $\lim_{x\to 0^+} \ln(x)$

    (o) $\lim_{n\to\infty} \sqrt{n+1} - \sqrt{n}$

3 Series

14. $\displaystyle\sum_{n=4}^{\infty} \sqrt{n+1} - \sqrt{n}$

15. $\displaystyle\sum_{n=4}^{\infty} \frac{1}{n} - \frac{1}{n+2}$

16. $\displaystyle\sum_{n=7}^{\infty} \frac{1}{2^n}$

17. $\displaystyle\sum_{n=-1}^{\infty} 3\frac{2^n}{3^{-n}}$

18. $\displaystyle\sum_{n=4}^{\infty} 3\frac{2^n}{3^n}$

19. $\displaystyle\sum_{n=4}^{\infty} \frac{n^3+17n^5}{3n^5-11}$

20. $\displaystyle\sum_{n=4}^{\infty} \left(1-\frac{3}{n}\right)^n$

21. $\displaystyle\sum_{n=1}^{\infty} ne^{-n^2}$.

22. $\displaystyle\sum_{n=1}^{\infty} \frac{n}{1+n^2}$.

23. $\displaystyle\sum_{n=1}^{\infty} \frac{2}{n^3}$.

24. $\displaystyle\sum_{n=1}^{\infty} \frac{n^2}{n!}$.

25. $\displaystyle\sum_{n=1}^{\infty} \frac{n!}{n^n}$.

26. $\displaystyle\sum_{n=1}^{\infty} \frac{(2n)!}{n^n}$.

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

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

29. $\displaystyle\sum_{n=1}^{\infty} \left(1-\frac{4}{n}\right)^{n^2}$.

30. $\displaystyle\sum_{n=1}^{\infty} \left(1-\frac{4}{n^2}\right)^{n^2}$.

31. $\displaystyle\sum_{n=1}^{\infty} \frac{4}{n^2+1}$.

32. $\displaystyle\sum_{n=1}^{\infty} \frac{\sqrt{n+1}}{n^2+2}$.

33. $\displaystyle\sum_{n=1}^{\infty} \frac{\sqrt{n^3+1}}{n^2+4}$.

34. $\displaystyle\sum_{n=1}^{\infty} (-1)^n \frac{4\sqrt{n^2+2}}{n^2+1}$.

35. $\displaystyle\sum_{n=1}^{\infty} (-1)^n \frac{4\sqrt{n^2+2}}{n^{3/2}+1}$.

36. $\displaystyle\sum_{n=1}^{\infty} (-1)^n \frac{4\sqrt{n^2+2}}{n+1}$.

37. $\displaystyle\sum_{n=1}^{\infty} \cos(n\pi) \frac{4n-1}{n+1}$.

38. $\displaystyle\sum_{n=1}^{\infty} \sin(n\pi) \frac{4n-1}{n+1}$.

39. $\displaystyle\sum_{n=1}^{\infty} \sin(n\pi) \frac{4}{n+1}$.