Math 1297, Calculus II

Test 2 answers as of May 4, 2007

1. $u = \cos(x)$

2. $4^5 \int \sin^3(\theta)\cos^2(\theta)$

3. $u = 3x$, $dv = \sin(5x)$

4. (a) $\frac{A}{x-3} + \frac{B}{(x-3)^2} + \frac{C}{x+1}$

   (b) $\frac{A}{x} + \frac{B}{x^2} + \frac{Cx}{x^2+4} + \frac{D}{x^2+4}$

5. $3\ln|x| + \frac{2}{x} + \frac{1}{3}\ln|3x-1| + C$

6. $-\frac{1}{5}\frac{x}{(9x^2-5)^{\frac{1}{2}}} + C$

7. (a) 0

   (b) 1

8. $R_3 < T_3 < M_3 < L_3$

9. $\int_1^e \sqrt{1 + (\frac{1}{x})^2}dx$

10. $S = \int_0^\pi 2\pi(\sin(x)+2)\sqrt{1+\cos^2(x)}dx$

11. Given $\epsilon > 0$ there exists an integer N such that $n > N$ implies $|a_n - L| < \epsilon$.

12. (a) 2,2/3, 2/9

    (b) 0

13. (a) 3/5 (divide numerator and denominator by n^2 and then take the limit as n goes to ∞)

    (b) 0 Use the sandwich theorem: $-\frac{1}{n} \le \frac{\cos(n)}{n} \le \frac{1}{n}$. The two outside sequences go to zero, so the middle one must also go to zero.

14. False. A counter example is the harmonic series.

15. (a) i geometric, ii NO since $r = 3/5 > 1$.

    (b) i Not geometric, ii No since $a_n \to 1/3 \neq 0$

    (c) i Not geometric, ii NO since it is the harmonic series which is known to diverge

16. Let $s_n = 2 + \frac{2}{5} + ... + \frac{2}{5^{n-1}}$. Then $\frac{1}{5}s_n = \frac{2}{5} + ... + \frac{2}{5^n}$. Subtracting these two equations gives $s_n - \frac{1}{5}s_n = 2 - \frac{2}{5^n}$. Solve for s_n to get $s_n = \frac{2-\frac{2}{5^n}}{(1-\frac{1}{5})} \to \frac{2}{(1-\frac{1}{5})} = \frac{5}{2}$

17. Extra Credit. $2\ln|x^2 - 2x + 2| + 5\arctan(x-1) + C$