Math 2012 C Calculus and Analytic Geometry II   Instructor: Dr. Predrag Punoševac

Final Exam

Student Name:_____

Student ID#:_____

Each problem is worth 10 point. Give a <u>complete</u> solution to receive the full credit!

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1. First use substitution and then use integration by parts to evaluate the integral $\int \ln(\sqrt{x})\,dx$.

2. Find the power series representation of the function $f(x) = x^2 \tan^{-1}(x^3)$ and determine the radius of convergence.

3. Evaluate the integral $\displaystyle\int_1^3 \frac{2x+3}{(x+1)(x+2)}\,dx$.

4. Determine whether the sequence $a_n = \frac{\cosh(n)}{n}$ converges or diverges. If it converges, find the limit.

5. Use the Comparasion Theorem to determine whether the integral $\displaystyle\int_1^\infty \frac{2 + e^{-x}}{x}\, dx$ is convergent or divergent.

6. Determine if the series $\sum_{n=0}^{\infty} \frac{1 + \sin(n)}{10^n}$ is convergent or divergent.

7. The curve $y = \frac{1}{4}x^2 - \frac{1}{2}\ln(x)$, $1 \le x \le 2$ is rotated about y-axis. Find the area of the resulting surface.

8. The region bounded by the curve $y = \ln(x)$, $y = 1$, $y = 2$, and $x = 0$ is rotated about the $y = 0$. Find the volume of the resulting solid.

9. Find the exact length of the curve $x = 3\cos(t) - \cos(3t)$, $y = 3\sin(t) - \sin(3t)$, $0 \le t \le \pi$.

10. Find the area of the region enclosed by one loop of the curve $r^2 = \sin(2\theta)$.