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FINAL SPRING 2011

MTH 232 CALCULUS II   NAME_____

Explain your answers—otherwise, no credit. Each part of each question is worth 5 points.

1.   a. $\displaystyle\int \frac{x^2+4}{x}\,dx =$ _____

      b. $\displaystyle\int \frac{x}{x^2+4}\,dx =$ _____

      c. $\displaystyle\int \frac{dx}{x^2+4} =$ _____

      d. $\displaystyle\int \frac{1}{x^2-4}\,dx =$ _____

2.   Draw a sketch of the region enclosed by $f(x) = x^2$ and $g(x) = x^{1/2}$ on the interval $[0,1]$ and label the curves.

Find the volume of the solid generated by revolving the region above around the x-axis.

3.   Determine whether the following series converge or diverge:

a. $\sum_{n=0}^{\infty} \left(\dfrac{e}{\pi} \right)^n$ Converges or diverges (circle the correct answer). Test: _____

Explanation:

b. $\sum_{n=1}^{\infty} \dfrac{(-1)^n}{\sqrt{n}}$ Converges or diverges (circle the correct answer). Test: _____

Explanation:

c. $\sum_{n=1}^{\infty} \frac{1}{\sqrt{n}}$ Converges or diverges (circle the correct answer). Test: _____

Explanation:

d. $\sum_{n=1}^{\infty} \left(1+\frac{1}{n}\right)^{n}$ Converges or diverges (circle the correct answer). Test: _____

Explanation:

4. a. Compute the Taylor series for $f(x) = \ln(x+1)$ centered at c=0.

    b. Compute the radius of convergence for the Taylor series in 4a.

5.   a.   Sketch the graph of the polar equation r = cos(t).

   b.   Write the Matlab commands needed to compute the area of the region enclosed by the polar graph of r = cos(t).

   c.   When r=cos(t), then x = _____ and y = _____

   Compute the slope of the tangent line to the graph of r = cos(t) at t= $\frac{\pi}{3}$ and draw this tangent line on your graph in 5a.

   d.   Find a mathematical expression for the arc length of the curve described by x and y in your answer to part c above and where $0 \le t \le \frac{\pi}{3}$. You do not need to compute the numerical answer.

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6.   Let $\mathbf{v} = \langle 1,-1,2 \rangle$ and $\mathbf{w} = \langle 0,3,5 \rangle$

a.   Sketch the vectors $\mathbf{v}$ and $\mathbf{w}$.

b.   Find the parametric equations of the line through the point (1,2,-1) in the direction of $\mathbf{v}$.

c.   Compute $\mathbf{v} \times \mathbf{w}$

d.   Find the equation of the plane that contains the vectors $\mathbf{v}$ and $\mathbf{w}$

7.   a. $\int \ln(x)dx = $ _____

       $\int \ln(x^2)dx = $ _____

b.   Extra Credit (5 points): $\displaystyle\int_0^1 \ln(x)\,dx =$ _____ Hint: Improper Integral and L'Hopital.