Fri Dec 2 15:55:16 MST 2005 /m175.fa05/handouts175/t4_175_C02/t4_175_C02

This test has pages 1 – 4. Take a moment to make sure you have them all.

No Calculators Allowed; No Reference Materials; Just You and Your Pencil and Eraser. Show your steps.

1 Let $\boldsymbol{x(t) = \sin(t)}$ and $\boldsymbol{y(t) = \sin(t)^2}$. Sketch the path showing the direction of traversal as $\boldsymbol{t}$ varies.

2 Set up the integral which gives the length of the path in problem 1. Do not *evaluate* the integral – just set it up so someone else could evaluate it.

3 Show steps in using derivatives to determine the slope and concavity of the path in problem 1 at the point where $\boldsymbol{t = \frac{\pi}{4}}$. (This should agree with your problem-1 answer)

4 Find the Taylor Series centered at $\boldsymbol{x = 2}$ for $\boldsymbol{f(x) = 6x^2 - 18x + 1}$.

5 Find the Taylor Series centered at $\boldsymbol{x = 2}$ for $\boldsymbol{f(x) = \dfrac{1}{1+x}}$.

6 Show steps in computing a series whose sum is $\boldsymbol{\displaystyle\int_0^{1/3} e^{-x^2}\,dx}$

7 Match the function with its power series. That is, fill each function's blank with the letter of its series. No blank should come up empty.

(i) ____ $\dfrac{1}{1+x}$

(ii) ____ $\dfrac{1}{1-x}$

(iii) ____ $\arctan(x)$

(iv) ____ $\ln(1+x)$

(v) ____ e^x

(vi) ____ $\cos(x)$

(vii) ____ $\sin(x)$

(viii) ____ $\cosh(x)$

(ix) ____ $\sinh(x)$

(A) $\displaystyle\sum_{n=1}^{\infty}(-1)^{n+1}\frac{x^n}{n}$

(B) $\displaystyle\sum_{k=0}^{\infty}\frac{x^{2k}}{(2k)!}$

(C) $\displaystyle\sum_{k=0}^{\infty}(-1)^k x^k$

(D) $\displaystyle\sum_{k=0}^{\infty}(-1)^k\frac{x^{2k+1}}{(2k+1)!}$

(E) $\displaystyle\sum_{n=0}^{\infty}(-1)^n\frac{x^{2n+1}}{2n+1}$

(F) $\displaystyle\sum_{m=0}^{\infty}\frac{x^m}{m!}$

(G) $\displaystyle\sum_{k=0}^{\infty}(-1)^k\frac{x^{2k}}{(2k)!}$

(H) $\displaystyle\sum_{k=0}^{\infty}x^k$

(I) $\displaystyle\sum_{k=0}^{\infty}\frac{x^{2k+1}}{(2k+1)!}$