

7.6 - Double Integrals

1. Calculate the following double integrals:

$$\int_{-2}^0 \int_{-1}^1 x e^{xy} dy dx \quad , \quad \int_0^3 \int_x^{2x} y dy dx$$

2. Calculate the volume over the region over the rectangle in the $x - y$ plane bounded by the lines $x = 1, x = 3, y = 0, y = 1$ and bounded above by the graph of $f(x, y) = x^2 + y^2$.

11.1 - Taylor Polynomials

1. Determine the third Taylor Polynomial of $e^{-x/2}$ centered at $x = 0$.
2. Determine the fourth Taylor polynomial of $\ln(x)$ centered at $x = 1$.
3. If the fourth Taylor polynomial of $f(x)$ centered at $x = 1$ is $p_4(x) = 2 - 6(x - 1) + \frac{3}{2!}(x - 1)^2 - \frac{5}{3!}(x - 1)^3 + \frac{1}{4!}(x - 1)^4$, what are $f''(1)$ and $f'''(1)$?

11.2 - Newton's Algorithm

1. What function would you use in order to utilize Newton's Algorithm to approximate $\sqrt{3}/2$?
Set up the equation that gives you the next x values in your approximation.
2. How would you use Newton's Algorithm to approximate a solution to $e^{3x} = (x + 4)^2$?
Set up the equation that gives you the next x values in your approximation.

11.3 - Infinite Series (Geometric)

1. Determine if the following series are Geometric. If they are determine if they are convergent. If they are convergent find the sum.

$$2 + \frac{2}{3} + \frac{2}{9} + \frac{2}{27} + \dots$$

$$\frac{1}{5} - \frac{1}{5^4} + \frac{1}{5^8} - \frac{1}{5^{12}} + \dots$$

$$\frac{5^3}{3} - \frac{5^5}{3^4} + \frac{5^7}{3^7} - \frac{5^9}{3^{10}} + \dots$$

$$\frac{2}{5^4} + \frac{2^4}{5^5} + \frac{2^7}{5^6} + \frac{2^{10}}{5^7} + \dots$$

2. A doctor wants to prescribe M mg of a drug to be taken daily by their patient for prolonged treatment. The body naturally eliminates 25% of the drug present in it's system. What should the daily dose be so that the amount of drug in the patient approaches 20 mg immediately after doses.

11.5 - Taylor Series

1. Using the Taylor Series for e^x find the Taylor Series for xe^{x^2} at $x = 0$ (show the first 4 non-zero terms)

2. Find the Taylor Series expansion at $x = 0$ of the integral

$$\int \frac{1}{1+x^3} dx$$

(show the first 4 non-zero terms)

3. Hyperbolic cosine of x is given by

$$\cosh x = \frac{1}{2}(e^x + e^{-x})$$

Use the Taylor series for e^x to compute the Taylor series for $\cosh x$ at $x = 0$. (show the first 4 non-zero terms)

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