

QUIZZES AND EXAMS

Week 2 Quiz

Problem 1. Find the area of the region enclosed by the curves $y = 2x^2$ and $y = 6x - x^2$.

Problem 2. Given

$$y(x) = \int_2^{\cos(x)} \frac{\tan(x)}{1+x+x^3} dx,$$

compute $y'(x)$.

Week 3 Quiz

Problem. Find the volume of the solid obtained by rotating the region bounded by the curves $y = (x+1)^2$, $x = 1$, and $x = 2$ about

- 1) the y -axis;
- 2) the line $y = -2$.

Week 4 Quiz

Problem 1. Find the length of the curve $y = \frac{1}{2}x^{3/2}$, for $x \in [0, 16]$.

Problem 2. Find the area of the surface generated by revolving the curve $x = 2\sqrt{3-y}$, for $y \in [0, 2]$, about the y -axis.

Super Quiz 1

Problem 1. (6 points.) Solve the initial value problem

$$\begin{cases} y'(x) = y(x) \cdot \tan(x), \\ y(0) = 5. \end{cases}$$

Problem 2. (4 points.) Find the volume of the solid obtained by rotating the region bounded by the curves $y = x^4 + 1$, $x = 0$, $x = 1$, and $y = 0$ about the y -axis.

Problem 3. (6 points.) Find the length of the curve

$$y = \frac{x^3}{6} + \frac{1}{2x},$$

for $x \in [1, 2]$.

Problem 4. (4 points.) Find the volume of the solid obtained by rotating the region bounded by the curves $y = e^x$, $x = 0$, $x = 1$, and $y = 0$ about the line $y = -1$.

Week 5 Quiz

Problem 1. Evaluate the integral

$$\int \ln^2(x^{10})dx.$$

Problem 2. Evaluate the integral

$$\int \cos^5(x)dx.$$

Midterm 1

Problem 1. (6 points.) Solve the initial value problem

$$\begin{cases} \frac{dy}{dx} = \frac{10 - y^2}{y \cdot (x - 3)^2} \\ y(5) = \sqrt{10 - e} \end{cases}.$$

Problem 2. (6 points.) Evaluate the integral

$$\int \frac{x + 1}{x^2 - 5x + 6} dx.$$

Problem 3. (4 points.) Evaluate the integral

$$\int \sin^5(x) \cos^2(x) dx.$$

Problem 4. (4 points.) Evaluate the integral

$$\int x^2 e^{-2x} dx.$$

Problem 5. (5 points.) Find the length of the curve

$$x = \frac{y^3}{3} + \frac{1}{4y},$$

for $y \in [1, 2]$.

Problem 6. (5 points.) Find the volume of the solid obtained by rotating the region bounded by the curves $y = x^5 + 2$, $x = 0$, $x = 1$, and $y = 0$ about the line $x = -1$.

Week 8 Quiz

Problem 1. Evaluate the integral

$$\int_{-\infty}^{\infty} \frac{x}{(x^2 + 3)^2} dx.$$

Problem 2. Evaluate the integral

$$\int_{1/2}^1 \frac{1}{\sqrt{(2x - 1)^3}} dx.$$

Week 10 Quiz

Problem 1. Find the sum of the series

$$\sum_{k=2}^{\infty} \frac{2 \cdot 3^{k-1}}{(3^k - 1)(3^{k-1} - 1)}.$$

Problem 2. Find the sum of the series

$$\sum_{k=1}^{\infty} \frac{2^{k+3}}{4^{k+1}}.$$

Super Quiz 2

Problem 1. Determine if the following series converges or diverges

$$\sum_{n=1}^{\infty} \sqrt{\frac{n-1}{n^4 + 3n^2 + 2}}.$$

Problem 2. Determine if the following series converges or diverges

$$\sum_{n=1}^{\infty} \frac{(2n+3)^2}{5^{2n}}.$$

Problem 3. Evaluate the following integral

$$\int_1^{\infty} \frac{1}{x(\ln(x) + 2)^{\frac{5}{2}}} dx.$$

Problem 4. Determine if the following series converges or diverges

$$\sum_{n=1}^{\infty} \frac{1}{n(\ln(n) + 2)^{\frac{5}{2}}}.$$

Midterm 2

Problem 1. Find the sum of the series

$$\sum_{k=1}^{\infty} \frac{3^{k-1}}{2^{2k+2}}.$$

Problem 2. Find the sum of the series

$$\sum_{n=1}^{\infty} \frac{-3}{n(n+1)}.$$

Problem 3. Determine whether the following series converges or diverges

$$\sum_{n=2}^{\infty} \frac{1}{\sqrt{(n-1)(n+3)(n+5)}}.$$

Problem 4. Find a power series representation for the function

$$f(x) = \frac{x}{3 + x^3}.$$

What is its radius of convergence?

Problem 5. Find the interval of convergence of the following power series

$$\sum_{k=0}^{\infty} (-1)^{k+1} \frac{3^{2k}(x-1)^k}{k^2 + k}.$$

Problem 6. Find the first four non-zero terms in the Maclaurin series for the function $f(x) = e^x \cos(x)$.

Week 15 Quiz

Problem 1. Find the angle between the vectors $\vec{a} = \langle 1, 3, -5 \rangle$ and $\vec{b} = \langle 2, 2, 1 \rangle$.

Problem 2. Find the area of the triangle with vertices $P = (1, -1, 2)$, $Q = (0, 4, 1)$, and $R = (3, 2, 1)$.

Final Exam

Problem 1. Solve the initial value problem

$$\begin{cases} y'(x) = \frac{x^2 \ln(x)}{\sqrt[3]{y}} \\ y(1) = 8 \end{cases}.$$

Problem 2. Find the volume of the solid obtained by rotating the plane region bounded by the curves $y = 1$, $x = 2$, $x = 4$, and $y = e^x$ about the x -axis.

Problem 3. Determine whether the following series converges or diverges

$$\sum_{n=1}^{\infty} \sqrt[4]{\frac{n^2 + n - 1}{5n^5 + 2n^4 + 3n^3 + 4n}}.$$

Problem 4. Find a power series representation for the function

$$f(x) = \frac{x^2}{16 + x^4}.$$

What is its radius of convergence?

Problem 5. Find the interval of convergence of the following power series

$$\sum_{k=0}^{\infty} (-1)^{k+1} \frac{3^{2k}}{k^3 + 1} (x - 1)^{2k}.$$

Problem 6. i) Find a vector orthogonal to the vectors $\langle 1, -3, 2 \rangle$ and $\langle 0, -1, 1 \rangle$.

ii) Find the equation of the plane containing the point $(1, 2, 0)$ and the line $x = 1 + t$, $y = 1 - 3t$, $z = 1 + 2t$, for $t \in \mathbb{R}$.

iii) Find the intersection of the line $x = 2 - t$, $y = 4 + 2t$, $z = 1 + 3t$ with the plane found in (ii).