

Math 152 Help Session Problem Set

- Find the area bounded by:
 - $x = y^2$ and $x - 2y = 3$.
 - $x = \cos x$, $y = \sin x$, $x = 0$, $x = \pi$
- Find the volume of the solid obtained by rotating the region R about the specified axis.
 - R is the region bounded by $y = x^2$ and $y = 2 - x^2$. Rotate around the x axis.
 - R is the region bounded by $y = x - x^2$, $y = 0$. Rotate around the y axis.
- Compute:
 - $\int_1^4 \sqrt{t} \ln t \, dt$
 - $\int \frac{\sqrt{x^2 - 4}}{x} dx$
- Using partial fractions, compute $\int \frac{1}{x^3 + 2x^2 + x} dx$
- Solve the differential equation:
 - $y' = e^{x-y}$ and $y(0) = 2$.
 - $(1 + x^2)y' + 2xy = 3\sqrt{x}$, $y(0) = 2$.
- Find the length of the curve $x = t^2$ and $y = t^3$, $1 \leq t \leq 2$.
 - Find the surface area obtained by revolving the curve $y = x^2/2$, $0 \leq x \leq 4$ about the y axis.
- A trough is filled with a liquid of density 840 kg per cubic meter. The ends of the trough are equilateral triangles with sides 8 m long and vertex at the bottom. Find the force on one end of the trough.
- Find the sum of the series:
 - $\sum_{n=1}^{\infty} \frac{1}{n(n+2)}$
 - $\sum_{n=1}^{\infty} \frac{(-3)^{n-1}}{4^n}$

9. a.) Determine whether $\sum_{n=2}^{\infty} \frac{1}{n(\ln n)^2}$ converges or diverges. Be sure to clearly state the test you applied and apply it completely and correctly.

b.) Find the radius and interval of convergence for the following power series:

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

10. Using the known Maclaurin series for $\sin x$, write $\int_0^{1/2} \sin(x^2) dx$ as an infinite series and approximate the sum with error less than 10^{-6}