THIRD TEST PROBLEMS

Q1. Find the centroid ot the triangle with vertices at (0,0), (1,0) and (0,2).

Q2. Find the centroid of the region under $y = e^x$ from $x = 0$ to $x = 1$.

Q3. A semi circular plate of radius 1 meter is suspended vertically in water with the top point of the curved side at the surface. Find the force on the plate.

Q4. A trough has a vertical cross-section that is an isosceles triangle with base 2 feet and height 3 feet. If the trough has 1 foot of water in it, measured vertically, Find the force on the end.

Q5. Find the limits of the sequences

$$n^2\left(1-\cos\left(\frac{1}{n}\right)\right), \qquad \left(1-\frac{1}{n}\right)^{2n}.$$

Q6. Decide convergence or divergence for the series whose n^{th} terms are

$$1-\cos\left(\frac{1}{n}\right), \quad \frac{(\ln n)^3}{n^2}, \quad (-1)^n(1+n^{-1})^n, \quad \frac{1}{n(\ln n)^2},$$

$$\sqrt{\frac{n^2+1}{n^5+2}}, \quad \frac{(-1)^n}{n^2+1}, \quad \frac{n^n}{(2n)^{2n}}, \quad \tan\frac{1}{n}, \quad \frac{3^{2n+1}}{4^{n+5}}$$

Q7. Find the intervals of convergence for

$$\sum \frac{(x-3)^{2n}}{4^n}, \quad \sum \frac{(x+1)^n}{n^2}$$

Q8. Explain why this is not possible: A power series converges at $x = 1$ and $x = 3$ but diverges at $x = 2$.