

Fayoum University
Faculty of Engineering

Preparatory Year
Mathematics
Prof. Dr. Samy El Badawy Yehia

Time : 3 Hours.
June, 12, 2010.
Second Term Final Exam.

1) Evaluate the following integrals:

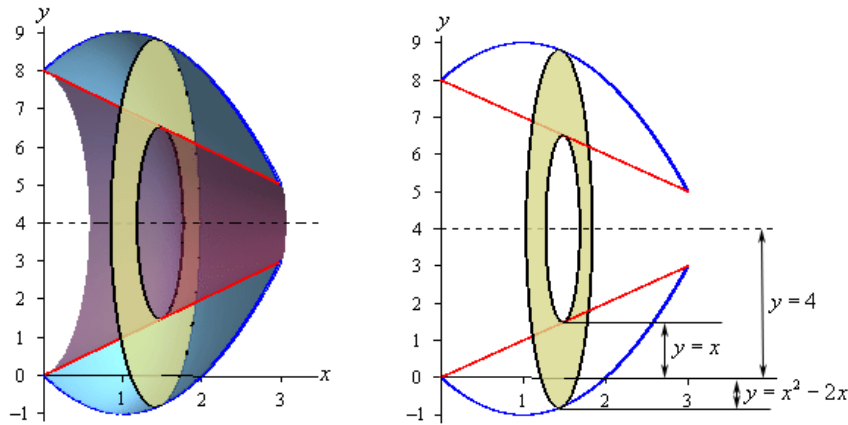
a) $\int 2x^3 \sqrt{x^2 + 1} dx,$

b) $\int \frac{\tan x}{\sec^4 x} dx,$

c) $\int \frac{1}{1 + \sin x} dx.$

30 points

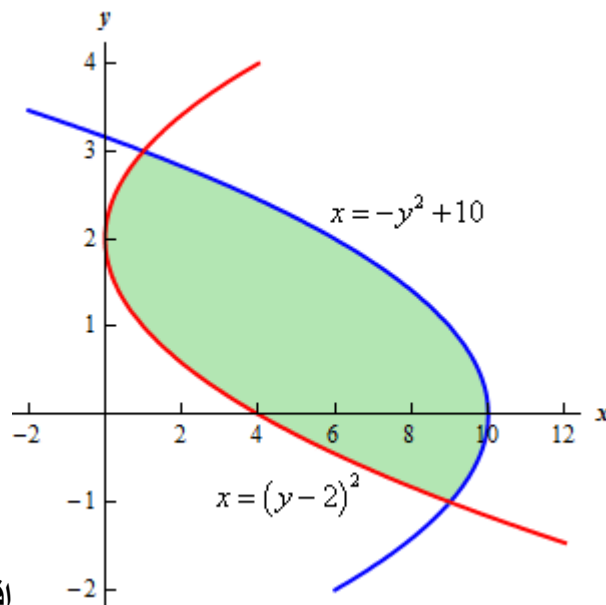
2) Determine the volume of the solid obtained by rotating the region bounded by :
 $y = x^2 - 2x$ and $y = x$ about the line $y = 4$.



20 points

3) Find the shown area between the two curves $x = -y^2 + 10$ and $x = (y - 2)^2$ by integrating :

- a) with respect to y,
b) with respect to x (set up an integral only).



إقلب الصفحة

20 points

4) Prove that the straight lines joining the origin to the points of intersection of the straight line $3x + 4y = 24$ with the circle $(x - 4)^2 + (y - 3)^2 = c^2$ are at right angles if $c = \pm 5$. 30 points

5) Find the value of λ that the plane $x - y + z = \lambda$ is tangent to the circle $(x - 2)^2 + (y + 1)^2 + (z - 1)^2 = 9$. Find the parametric equation of the straight line joining the centre of this circle to the point of tangency of this circle to this plane. 20 points

6) Find the equation of the tangent and the normal at any point $(\frac{c}{t}, ct)$ of the rectangular hyperbola $xy = c^2$. 20 points

GOOD LUCK