University Of Jordan - Aqaba
Faculty of Systems and information technology
Department of computer information systems

Calculus 2 | **Midterm Exam** | **1st Semester**
Date : 18/11/2015 | **2015/2016**

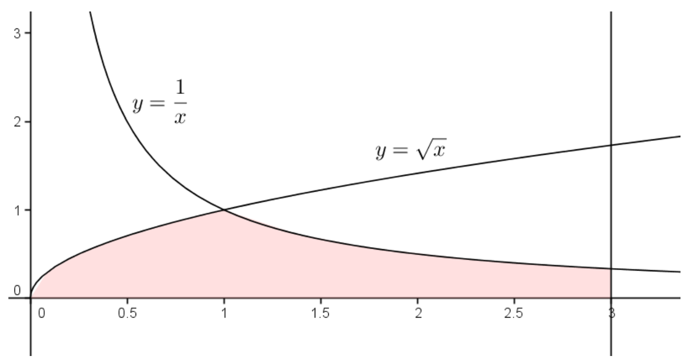
Student name:
Student number:

Question 1. Find the area of region enclosed between the curves

$$f(x)=\frac{1}{x} \quad , \quad g(x)=\sqrt{x} \quad , \quad y=0 \quad \text{and} \quad x=3.$$

$$A=\int_0^1 x^{\frac{1}{2}}.dx+\int_1^3 \frac{1}{x}.dx$$

$$=\left[\frac{2}{3}.x^{\frac{3}{2}}\right]_0^1+\left[Ln(x)\right]_1^3=\frac{2}{3}+Ln(3)$$



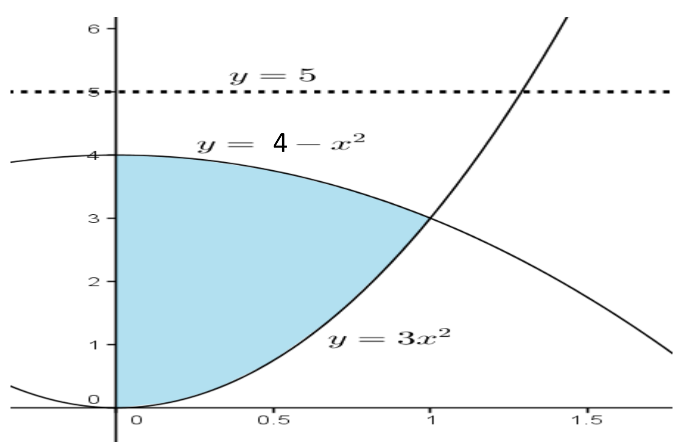
Question 2. Find the volume of the solid that results when the region enclosed by $y=3x^2$, $y=4-x^2$ and $x=0$ is revolved about the line $y=5$.

$$A=\pi\int_0^1 (5-3x^2)^2.dx-\int_0^1 (5-4+x^2)^2.dx$$

$$=\pi\int_0^1 25-30x^2+9x^4.dx-\pi\int_0^1 1+2x^2+x^4.dx$$

$$=\pi\left[25x-\frac{30x^3}{3}+\frac{9x^5}{5}\right]_0^1-\left[x+\frac{2x^3}{3}+\frac{x^5}{5}\right]_0^1$$

$$=\pi\left[25-10+\frac{9}{5}\right]-\pi\left[1+\frac{2}{3}+\frac{1}{5}\right]=\frac{84}{5}\pi-\frac{28}{15}\pi=$$



Question 3. Find

1. $\int \frac{t \cdot e^t}{(t+1)^2} .dt$

$\langle y = t+1 \quad \Rightarrow \quad dy = dt \rangle$

$\int \frac{(y-1)\, e^{y-1}}{y^2} .dy = \int \frac{y}{y^2} .e^{y-1} .dy - \int \frac{1}{y^2} .e^{y-1} .dy$

$= \int \frac{1}{y} .e^{y-1} .dy - \int \frac{1}{y^2} .e^{y-1} .dy$

$u = \frac{1}{y} \qquad dv = e^{y-1} .dy$

$du = \frac{-1}{y^2} .dy \qquad v = e^{y-1}$

$= \frac{1}{y} .e^{y-1} - \int \frac{-1}{y^2} .e^{y-1} .dy - \int \frac{1}{y^2} .e^{y-1} .dy$

$= \frac{1}{y} .e^{y-1} + c$

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

$\frac{x+1}{x.(2-x)} = \frac{A}{x} + \frac{B}{2-x}$

$x+1 = A(2-x) + Bx$

$\xrightarrow{x=0} 1 = 2A \quad \Rightarrow \quad A = \frac{1}{2}$

$\xrightarrow{x=2} 3 = 2B \quad \rightarrow B = \frac{3}{2}$

$\int \frac{\frac{1}{2}}{x} + \frac{\frac{3}{2}}{2-x} .dx = \frac{1}{2} Ln|x| + \frac{3}{2} Ln|2-x| + c$

3. $\int \sec^4 x . \tan^9 x.dx$

$\int \tan^9 x \sec^2 x.\sec^2 x \;\; .dx = \int \tan^9 x .(1+\tan^2 x).\sec^2 x \;\; .dx$

$u = \tan x \quad \Rightarrow \quad du = \sec^2 x.dx$

$\int u^9 .(1+u^2).\sec^2 x \;\; .\frac{du}{\sec^2 x} = \int u^9 + u^{11} .du = \frac{u^{10}}{10} + \frac{u^{12}}{12} + c$

4. $\int \sqrt{x}.\sin\left(\sqrt{x}\right) dx$

$u = \sqrt{x}$

$du = \frac{1}{2\sqrt{x}} .dx$

$\int u.\sin u.2u.du \;\; = \int 2u^2 .\sin u.du$

u	dv
$2u^2$	$\sin u$
$4u$	$\cos u$
4	$-\sin u$
0	$-\cos u$

$= 2u^2 .\cos u - 4u.\sin u - 4\cos u + c$