

American University of Beirut
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Name:

1
Math 102
Final Exam
Fall 2003

****GOOD LUCK****

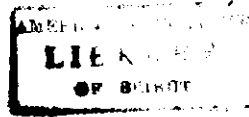
1 Determine each of the following.

$$\int \frac{x^3 - x^2 + 2x}{x^2 + 2} dx$$

$$\int \frac{dx}{\sqrt{2x - x^2}}$$

$$\int \frac{\sqrt{16x^2 - 9}}{x} dx$$

$$x \geq 3/4$$

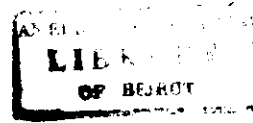


$$\int_{-\infty}^0 xe^{3x} dx$$

$$\int_0^{\infty} \frac{dx}{\sqrt{x^8+1}}$$

$$\int_0^2 \frac{dx}{1-x^2}$$

$$\lim_{x \rightarrow \infty} \left(\frac{5x+2}{5x-3} \right)^x$$

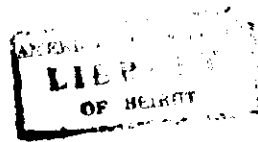


2 What curve is given by the following parametric representations
 $x = 3 + 2 \cos 2t$ $y = 5 + 3 \sin 2t$

3 Find the equation of the plane through the point (2,4,5) perpendicular to the line
 $x = 5 + t$, $y = 1 + 3t$, $z = 4t$

4 Find the area of a triangle with vertices P(1, 3, 2), Q(2,1,-1), R(-3,1,5)

5 Find the angle between the planes $2x + 2y - z = 3$, $x + 2y + z = 2$



6 Find the length of the curve $r = \cos^3(\theta/3)$, $0 \leq \theta \leq \pi/4$

7. Find the area of the region shared by the circles $r = 4 \cos \theta$ and $r = 4 \sin \theta$

8. A force $\mathbf{F} = 2\mathbf{i} + \mathbf{j} - 3\mathbf{k}$ Newtons is applied to a spacecraft with velocity vector $\mathbf{v} = 3\mathbf{i} - \mathbf{j}$. Express \mathbf{F} as a sum of a vector parallel to \mathbf{v} and a vector orthogonal to \mathbf{v} .