American University of Beirut
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Name:

Math 102
Final Exam
Fall 2002

****GOOD LUCK****

1. Determine each of the following:

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

b. $\int \frac{dx}{e^x + 1}$

c. $\int_3^{\infty} \frac{2dx}{x^2 - 2x}$

d. $\int \frac{\cos(\sin^{-1}x)}{\sqrt{1-x^2}}\, dx$

e. $\int (x+1)^2 e^x\, dx$

f. $\int \frac{x^2\, dx}{x^2 + 4}$

2. What curve is given by the following parametric representations
$x = 2 + 2\,\text{Cos}2t \qquad y = 3 + 3\,\text{Sin}\,2t$

3. Find the equation of the plane through the point (1,-1,3) parallel to the plane $3x + y + z = 7$

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 $\mathbf{A} = \mathbf{i} - 2\mathbf{j} - 2\mathbf{k}$ **and** $\mathbf{B} = 6\mathbf{i} + 3\mathbf{j} + 2\mathbf{k}$

6. Find parametric equations for the line through P(1,2,0) and Q(1,3,-1).

7. Find the angle between $y = (3/2) - x^2$ and $y = x^2$

8. Find the length of the curve $r = \cos^3(\theta/3), \qquad 0 \le \theta \le \pi/4$

9. Find the area inside the graph of $r = 1$ and outside the graph of
$r = 1 - \cos\theta$

10. Find the angle between the planes $x = 7$ and $x + y + \sqrt{2}\,z = -3$

11. Test for convergence or divergence. State your reasons

$\int_1^{\infty} \frac{dx}{\sqrt{(x^6 + 1)}}$