King Fahd University of Petroleum & Minerals
Department of Mathematical Sciences
Math 102 - 22
Dr. Jawad Y. Abuihlail

2nd Major Exam   **Semester 032**

Name: **ID #:**   **Section #:**

Q1. (10 Points - Suggested time: 5 minutes) State if each of the following statements is true or false:

1. If $y = f(x)$ is continuous and symmetric about the origin on the interval $[-b, b]$, then $\int_{-b}^{b} f(x)dx = 0$.

2. The equation $\cosh(x) - 2 = 0$ has only one solution.

3. $\int_{0}^{2\pi} \sin(3x)\cos(2x)dx = 0$.

4. The range of $f(x) = \tanh(x)$ is $(-\infty, \infty)$.

5. $y = 3 - \cosh(x)$ is a solution of the I.V.P.

$$y'' = \cosh(x), \ y'(0) = 0, \ y(0) = 2.$$

Q2. (10 Points - Suggested Time: 15 Minutes) Draw (showing all details):

$$f(x) = -\ln(x + e^2) + 2.$$

Q3. (30 Points - Suggested Time: 30 Minutes) Consider the region in the first quadrant enclosed by $y = x^2 - 4$ and $y + x = 2$ and $y = -(x+2)$. Showing all details:

1. find the area of the region.

2. find the volume of the object obtained by revolving the region about the x-axis.

3. find the volume of the object obtained by revolving the region about the y-axis.

Q5. (10 Points - Suggested time: 10 Minutes) Find the surface area of the object obtained by revolving the region between the curves of $f(x) = x^3$ and $f(x) = 0$ about the x-axis.

Q5. (40 Points - Suggested time: 20 Minutes) Evaluate the following integrals <u>showing all details</u>

1. $\int_0^1 x \tan^{-1}(x) dx$

2. $\int \sin^2(x) \cos^4(x) dx$

3. $\int \frac{e^x}{e^{4x}-2e^{3x}+2e^{2x}-2e^x+1}dx$

4. $\int \sec^4(x)dx$

GOOD LUCK