Calculus III (MAC 2313-17772)
Homework #5
Due: Monday, October 25, 2004

- Do all or most of exercises 1-20 of Section 15.2. Hand in:
  1. 15.2#14: Calculate the double integral
     \[ \int \int_{R} \cos(x + 2y) \, dA, \quad R = \{(x, y) : 0 \leq x \leq \pi, 0 \leq y \leq \pi/2 \}. \]
  2. 15.2#20: Calculate the double integral
     \[ \int \int_{R} \frac{x}{x^2 + y^2} \, dA, \quad R = [1, 2] \times [0, 1]. \]

- Textbook, 15.2#28: Find the volume of the solid bounded by the elliptic paraboloid \( z = 1 + (x - 1)^2 + 4y^2 \), the planes \( x = 3 \) and \( y = 2 \) and the coordinate planes.

- Of Section 15.3 most exercises in the groupings 1-32 and 37-52 should be attempted or, at least, looked at. The following ones should be handed in.
  4. #8: Evaluate the double integral
     \[ \int \int_{D} \frac{4y}{x^3 + 2} \, dA, \quad D = \{(x, y) : 1 \leq x \leq 2, 0 \leq y \leq 2x \}. \]
  5. #14: Evaluate the double integral
     \[ \int \int_{D} (x + y) \, dA, \quad D \text{ is bounded by } y = \sqrt{x}, \text{ and } y = x^2. \]
  6. #16: Evaluate the double integral
     \[ \int \int_{D} xy^2 \, dA, \quad D \text{ is enclosed by } x = 0, \text{ and } x = \sqrt{1 - y^2}. \]
  7. #18: Evaluate the double integral
     \[ \int \int_{D} 2xy \, dA, \quad D \text{ is the triangular region of vertices } (0, 0), (1, 2), \text{ and } (0, 3). \]
  8. #20: Find the volume of the solid under the surface \( z = 2x + y^2 \) and above the region bounded by \( x = y^2 \) and \( x = y^3 \).
  9. #28: Find the volume of the solid bounded by the cylinders \( x^2 + y^2 = r^2 \) and \( y^2 + z^2 = r^2 \).
10. #44: Evaluate the integral by reversing the order of integration

$$\int_0^1 \int_{\sqrt{y}}^1 \sqrt{x^3 + 1} \, dx \, dy.$$  

11. #48: Evaluate the integral by reversing the order of integration

$$\int_0^8 \int_{\sqrt{y}}^2 e^{x^4} \, dx \, dy.$$  

- Once you are finished with all this, go to section 15.4 and look at exercises 1-34. I’ll assign some for the next homework, with #34 having a high probability of being assigned.