HOMEWORK 7 **DUE: Fri., Feb. 19** **NAME:**

DIRECTIONS:

- **STAPLE** this page to the front of your homework (don't forget your name!).
- Show all work, clearly and in order **You will lose points if you work is not in order**.
- When required, **do not forget the units**!
- Circle your final answers. **You will lose points if you do not circle your answers**.

Question	Points	Score
1	2	
2	3	
3	2	
4	3	
Total	10	

Problem 1: (2 points) Compute the volume of the solid bounded by the surface $z = \sin y$, the planes $x = 1$, $x = 0$, $y = 0$, and $y = \pi/2$, and the xy plane.

Problem 2: (3 points) Let D be the region bounded by the positive x and y axes and the line $12x + 4y = 12$. Compute

$$\int\int_D \left(x^2 + y^2\right) dA.$$

Problem 3: (2 points)

(a) Prove the Mean Value Theorem for Double Integrals. That is, suppose $f : D \to \mathbb{R}$ is continuous and D is an elementary region. The for some point (x_0, y_0) in D we have

$$\int\int_D f(x, y)dA = f(x_0, y_0)A(D),$$

where $A(D)$ is the area of D.

(b) Use the mean value theorem to show that if $D = [-1, 1] \times [-1, 2]$, then

$$1 \leq \int\int_D \frac{1}{x^2 + y^2 + 1} dxdy \leq 6.$$

Problem 4: (3 points) Evaluate the following integrals.

(a) (1 point) $\int_0^4 \int_{y/2}^2 e^{x^2} dxdy$

(b) (1 point) $\int_0^1 \int_0^x \int_0^y (y + xz) dzdydx$

(c) (1 point) $\int \int \int_W z dxdydz$, where W is the region bounded by $x + y + z = a$ (with $a > 0$), $x = 0$, $y = 0$, and $z = 0$.