Date. March 16, 2013 Math 215- MidTerm No. 1 -

1. Sketch the domain of

$$f(x,y) = \frac{\sin^{-1}(x-y)}{\sqrt{9-x^2-y^2}}.$$

2. Evaluate each limit (if any)

$$\lim_{(x,y)\to(2,0)} \frac{xy+3x-2y-6}{x^2y+4-4y-x^2}, \quad \lim_{(x,y)\to(0,1)} \frac{x^2y-x^2}{x^2+y^2-2y+1}, \quad \lim_{(x,y)\to(0,0)} \frac{\sin(xy)}{x^2+y^2}.$$

3. Find $f_x - f_{yx}$ where $f(x,y) = xe^y - x\cos(xy) + 1$.

4. Find the absolute max/min of $\varphi(x,y) = x^2 - 6x + y^2 - 4y$ on the closed region bounded by the coordinates axes and the line $x + y = 7$.

5. Assume that $w = F(t^2+2t+1, t^3-t+2)$, where F is a differentiable function with $F_u(1,2) = 3$ and $F_v(1,2) = 4$. Find $\dfrac{dw}{dt}$ at $t = 0$.

6. Reverse the order of integration and evaluate the resulting integral

$$\int_0^9 \int_{\sqrt{y}}^3 \sin(x^3)\, dx\, dy.$$

7. Find the volume of the solid in the first octant bounded above by $z = 9 - x^2$, below by $z = 0$ and laterally by $y^2 = 3x$.

8. Show that w satisfies the wave equation

$$w_{tt} = a^2 w_{xx}, \text{ where } w = (x-at)^4 + \cos(x+at).$$

9. Evaluate

$$\int_0^{\ln(2)} \int_0^1 xye^{y^2x}\, dy\, dx.$$

Q1	4	Q6	5
Q2	15	Q7	5
Q3	6	Q8	5
Q4	10	Q9	5
Q5	5		
Total	60		