Math. 201 Quiz II N. Nahlus & H. Yamani

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Name ..... **I.D** .....

Circle your section number

(Sec 9 at 1W) (sec 10 at 12:30T) (sec 11 at 2T) (sec 12 at 3:30T)

1. (10%) Find the equation of the tangent plane to the surface $2x^2 + y^2 + 4xz - 7 = 0$ at the point (1, 1, 1).

2. (10%) Find the points on the surface $2y^4 + x^2 - 9 = 4yz$ where the tangent plane is perpendicular to the xy plane

3. (10%) The equation $x^5 - x^2y^7 + 2yz - 8 = 0$ defines y implicitly as a function of x and z. Find the value of $\partial y / \partial z$ at the point $(1,1,4)$ (by any method)

4) (10%) Investigate the critical point (1, 1) in the function $f(x,y) = x^5 + y^5 - 5xy + 1$.

5a. (5%) Find $\lim_{(x,y)\to(0,0)} xy\,(\sin\frac{1}{x^2})(\cos\frac{1}{y^2})$. **Justify your answer**

5b. (5%) Investigate $\lim_{(x,y)\to(0,0)} \frac{x^4y^6}{x^6+y^3}$ (Hint: Use the curve $y^3 = -x^6 + mx^{16}$)

8a. (5%) Set up **but do not evaluate** the integral(s) in polar coordinates that represent the area **outside the circle** $r = 1$ and **inside the lemniscate** $r^2 = 2\cos 2\theta$. (**Hint**: sketch carefully)

8b. (5%) Set up **but do not evaluate** the integral(s) in **polar coordinates** to find the **area** of the plane region in the 1st quadrant bounded by the parabola $y = 3x^2$, the y - axis, and the straight line $y = 3$.

9. (10%) Find the **minimum** possible directional derivative of $f(x,y)$ at the point $p(-1, 2)$ given that $(D_v f)(p) = 20$ & $(D_w f)(p) = 4$ where $\mathbf{v} = 4\mathbf{i} + 3\mathbf{j}$ & $\mathbf{w} = 7\mathbf{j}$. (Hint: Use 2 equations in 2 unknowns)

10. (10%) Find the absolute maximum & absolute minimum of the function

$$T(x,y) = 3x^2 + 2y^2 - 4y + 30$$

on the circle $x^2 + y^2 = 9$.