Section_____Name_____ID_____

MATH 253 EXAM 1 Spring 1998
Sections 501-503 P. Yasskin

Problems 1 – 3: Find the plane tangent to the the graph of the function $f(x,y) = \dfrac{36}{1+x^2+y^2}$ at the point $(x,y) = (1,2)$. Write the equation of the plane in the form $z = Ax + By + C$ and find the values of A, B and C in problems 1, 2 and 3:

1. (3 points) $A =$
- **a**. -4
- **b**. -2
- **c**. 0
- **d**. 2
- **e**. 4

2. (3 points) $B =$
- **a**. -4
- **b**. -2
- **c**. 0
- **d**. 2
- **e**. 4

3. (3 points) $C =$
- **a**. -4
- **b**. 3
- **c**. 6
- **d**. 9
- **e**. 16

4. (3 points) If the function $f(x,y) = \dfrac{36}{1+x^2+y^2}$ represents the height of a mountain and you are at the point $(x,y) = (1,2)$, in what direction should you walk to go directly **down** hill?
- **a**. $(-4,-2)$
- **b**. $(-2,-4)$
- **c**. $(4,2)$
- **d**. $(2,4)$
- **e**. None of these

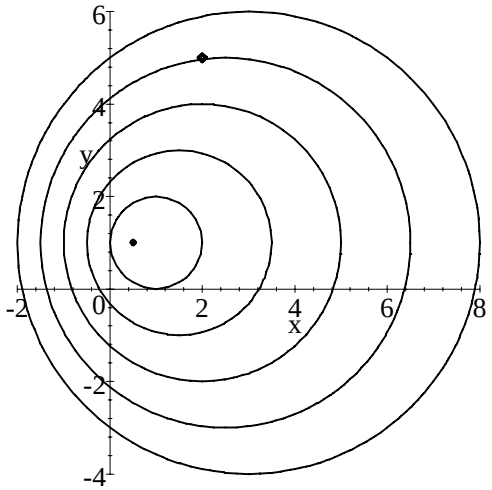
Problems 5 – 7: Find the plane tangent to the the graph of the equation $xe^z + ze^{xy} = 2$ at the point $(x,y,z) = (0,1,2)$. Write the equation of the plane in the form $z = Ax + By + C$ and find the values of A, B and C in problems 5, 6 and 7:

5. (3 points) $A =$
- **a**. $-2 - e$
- **b**. $2 + e$
- **c**. $-2 - e^2$
- **d**. $2 - e^2$
- **e**. 0

6. (3 points) $B =$
- **a**. $-2 - e$
- **b**. $2 + e$
- **c**. $-2 - e^2$
- **d**. $2 - e^2$
- **e**. 0

7. (3 points) $C =$
- **a**. 2
- **b**. $-e$
- **c**. $\frac{1}{e}$
- **d**. $\frac{2}{e}$
- **e**. e^2

8. (5 points) Below is the contour plot of a function $f(x,y)$. If you start at the point $(2,5)$ and move along a curve whose tangent vector is always $\vec{v} = \vec{\nabla} f$, draw the curve in the plot.



9. (12 points) Find all critical points of the function $f(x,y) = 1 + 2xy - x^2 - \frac{1}{9}y^3$ and classify each as a local maximum, a local minimum or a saddle point.

10. (12 points) Find the point on the paraboloid $z - \frac{1}{2}x^2 - \frac{1}{2}y^2 = 0$ which is closest to the point $(1, 2, 1)$.

1-7	
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