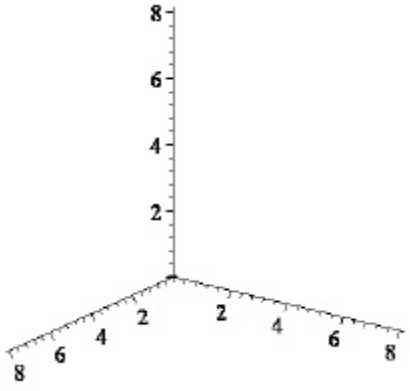
MAT 152 Exam #2 **Name** _____

Column	Points	Score
1	10	
2	15	
3	13	
4	12	
Total	50	

Instructions:

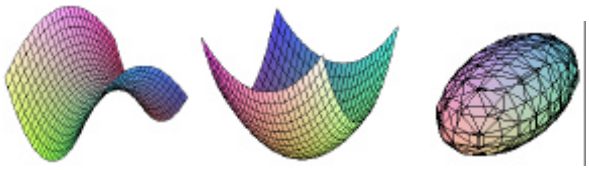
1. Do all of your work in this booklet.
2. **Show all of your steps** in problems for full credit.
3. **Be clear and neat** in your work. Any illegible work, or scribbling in the margins, will not be graded.
4. Place your **answers in a box**.
5. If you need more space, you may **use the back of the page** and write **On back Page #** in the problem space.

1. Sketch $2x+3y+4z=12$ in the first octant. Label the intercepts.



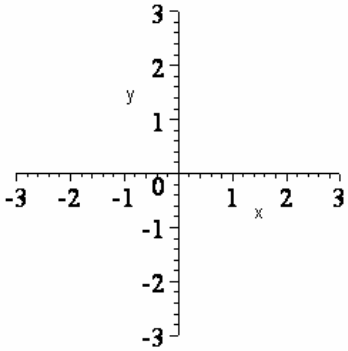
2. Match the graph of the surface. *Place letter in blank.*

A B C



Ellipsoid ____ Saddle ____ Paraboloid ____

3. Sketch three level curves for $z = y + x^2$.



3. Let $f(x,y)=3x^3y^2$. Find

a. $f_x(-2,1)$.

b. $f_{xy}(-2,1)$.

4. Let $w(s,t)=se^{s^2t}$. Find $\dfrac{\partial^2 w}{\partial s^2}$.

5. Find the total differential dz given that $z=\ln(x^2+xy)$.

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6. Describe how one finds and classifies the relative extrema for a function $f(x, y)$.

7. Find and classify the critical point(s) for $f(x, y) = 4xy + 8x - 9y.$

8. Find the points on the ellipse $x^2 + 2y^2 = 1$ where $f(x, y) = xy$ has its extreme values.

9. Compute the following integrals:

a. $\iint_R ye^{y^2+x}\, dxdy,\ 0 \le x \le 1, 0 \le y \le 1.$

b. $\int_0^1 \int_0^{x^2} y\, dydx.$

10. A cylindrical bottle of liquid has an outside radius of 2.5 cm and an outside height of 6.0 cm. If the bottle is made with material 0.1 cm thick, what is the volume of liquid inside the bottle?

Bonus: Find positive numbers x and y, whose sum is 90, such that $x^2 y$ is maximized.