
Math 242
Review sheet for Final Exam

The final exam is comprehensive. You should study the previous review sheets as well as the two midterms. Below I have only given review problems for the material we covered after the second midterm.

1. Let $f(x, y) = 3x^2y + x^3 + y - 2$. Find the equation for the tangent plane to the graph of f at the point $(2, 1, 3)$.
2. Find and classify the critical points of the function $f(x, y) = x^3 - y^3 - 2xy$.
3. You want to build a rectangular box. The material for the four sides will cost $\$0.50/\text{ft}^2$ and the material for the top and bottom will cost $\$0.75/\text{ft}^2$. If the box is to have volume 6000ft^3 , what should the dimensions be to minimize the cost?
4. Find and classify the critical points of the function $f(x, y) = 2x^2 - 6xy - y^3$.
5. Consider the linear system

$$\begin{aligned}3x + 2y + 4z &= 10 \\2x - y - 5z &= 6 \\6x + y + z &= 4.\end{aligned}$$

Give the augmented matrix for this linear system, and then give the rref form of the matrix. Write down the general solution to the linear system.

6. Consider the linear system

$$\begin{aligned}2x - 4y + 3z + 29w &= 4 \\x - 2y + 7w &= 1 \\x - 2y + z + 12w &= 1 \\3x - 6y - z + 16w &= 2.\end{aligned}$$

Give the augmented matrix for this linear system, and then give the rref form of the matrix. Write down the general solution to the linear system.

7. Consider the linear system

$$\begin{aligned}x - 2y - z &= 1 \\y + 2z &= 2 \\3x - 2y + 5z &= 11\end{aligned}$$

Give the augmented matrix for this linear system, and then give the rref form of the matrix. Write down the general solution to the linear system.