

PROBLEM SET #9

Due Friday, April 19, 2024 @ 12:30 pm

Submit as single pdf file to Canvas

Remember to review the [Guidelines for WeBWorK and Problem Sets](#) on the course webpage when writing up your solutions. The rule of thumb is that you should give enough explanation so that you could hand your assignment to a student who took Calc II last semester and they could follow your solutions.

1. Let $f(x, y) = x e^{-\frac{x^2}{2}} - \frac{y^3}{3} + y$.

Show that $(-1, -1)$, $(-1, 1)$, $(1, -1)$, and $(1, 1)$ are critical points of $f(x, y)$. That is, show both partial derivatives of f are zero at each of these points.

In fact, these are the only critical points of $f(x, y)$.

2. Use a contour plot to classify each critical point in #1 as a local max, local min, or saddle point.

3. Let $f(x) = x^2 + 4$ and $g(x) = -x^4 + x^3 + 2x^2 - 1$.

Find the points on the graphs of $y = f(x)$ and $y = g(x)$ that are closest to each other.

How far apart are they?

Note: This problem will be graded out of 6 points.