

MATH201, 2007 – ANSWERS TO EXERCISES 8.4

5. There is one critical point at $(1/3^{1/3}, 0)$. In this case, $AC - B^2 = 0$, so the $AC - B^2$ test is inconclusive.

6. Maximum is $\frac{\sqrt{2}-1}{2}$, minimum is $\frac{-\sqrt{2}-1}{2}$.

7. $f(x, y) \geq 0$ in the given region. Minimum is 0 when $x = 0$ or $y = 0$, and this is an absolute minimum. The only critical point inside the region is $(2, 1)$. The absolute maximum is at $(2, 1)$ and its value is $4e^{-3}$. To get this we need to check the maximum value of the function on the boundary. This occurs at $(8/3, 4/3)$ with value $\frac{256}{27}e^{-4}$. However,

$$4e^{-3} > \frac{256}{27}e^{-4},$$

so the absolute maximum is the value at $(2, 1)$.

8. There is a relative minimum at $(1, 1)$ and its value is -1 . There is a saddle point at $(0, 0)$.

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