

## MATH 2220 HW5.

**Due Wednesday 8 October**

(1) Section 3.3 p. 202.

(a) # 5.

(b) # 6.

(2) p. 222 - 225.

(a) # 6.

(b) # 33.

(c) # 41(b).

(3) Section 3.4 p. 243 - 246.

(a) # 5

(b) # 12.

(c) # 30.

(4) Let  $f : \mathbb{R}^2 \rightarrow \mathbb{R}$  be a  $C^\infty$  function with a critical point at  $(0, 0)$ . Suppose the Hessian matrix of  $f$  at  $(0, 0)$  is

$$Hf(0, 0) = \begin{bmatrix} 1 & 0 \\ 0 & 0 \end{bmatrix}$$

(a) Give an example of such an  $f$  which has a local minimum at  $(0, 0)$ .

(b) Give an example of such an  $f$  which has a saddle point at  $(0, 0)$ .

(c) Can  $f$  have a local maximum at  $(0, 0)$ ?