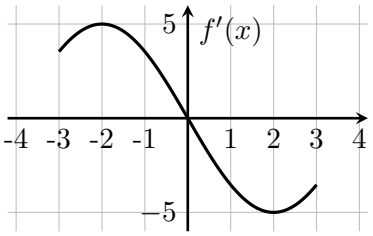
MATH 1300

1. The graph of $f'(x)$, the derivative of $f(x)$, is shown below.



(a) Where does the absolute maximum of $f(x)$ on $(-3, 3)$ lie? Fully justify your answer.

(b) Where do the inflection points of $f(x)$ lie? Fully justify your answer.

2. (a) Is $f(x) = 5+54x-2x^3$ guaranteed to have an absolute maximum and absolute minimum on the interval $[0, 4]$? Explain in full English sentences.

   (b) Find the absolute maximum and absolute minimum of $f(x) = 5 + 54x - 2x^3$ on the interval $[0, 4]$ if they exist. Fully justify and explain your answers.

3. (a) Find and classify all critical numbers of $f(x) = 3xe^{-2x}$. Fully justify and explain your answers.

   (b) Find the absolute maximum of $f(x) = 3xe^{-2x}$ for $x > 0$. Fully justify and explain your answers.