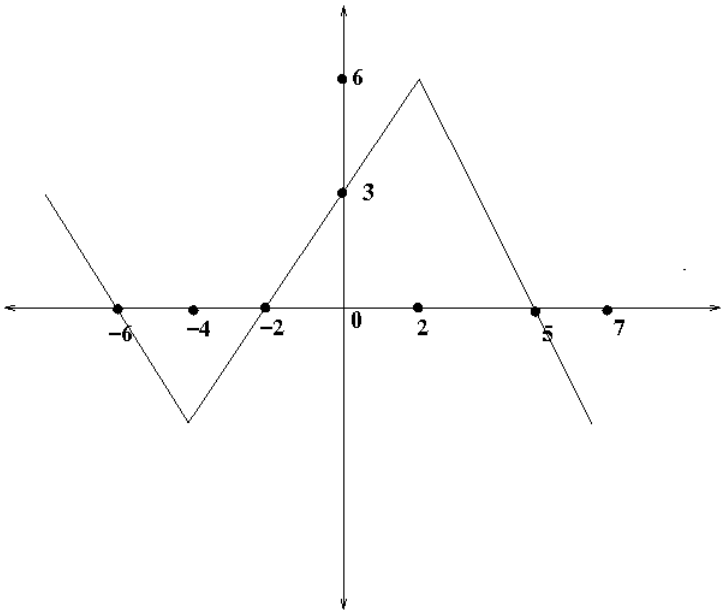
Question 1: The graph of $y = f(x)$ is given below. Sketch the graph of

$$y = 2f(3x + 3) + 1.$$

Be sure to find the coordinates of the points in your graph which correspond to the labeled points in the graph below, and label them on your graph.



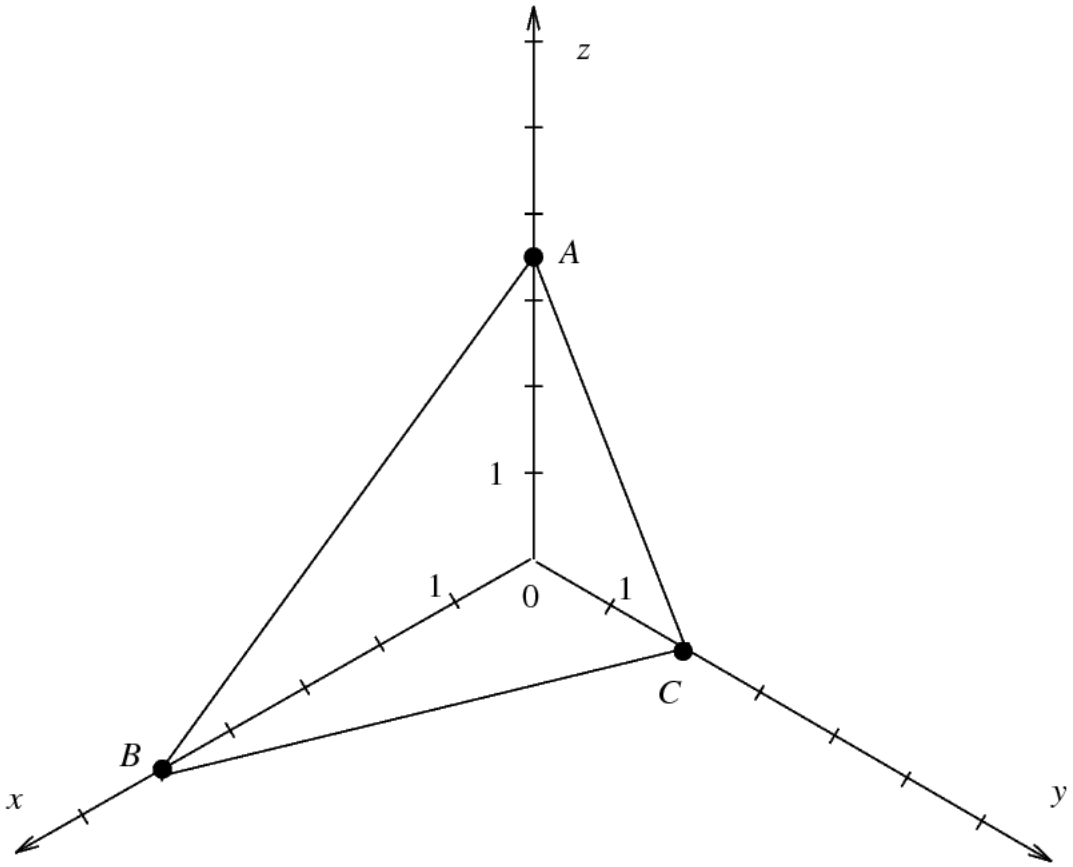
Question 2: Let $f : \mathbb{R} \to \mathbb{R}$ be given by

$$f(x) = e^{-\frac{x^2}{2}}$$

(a) Find f' and f''.

(b) Sketch the graph of f and mark the intervals (if any) where the f'' is positive and negative.

Question 3 The graph of $z = f(x, y)$ is the plane passing through the points A, B, C.



Find $\frac{\partial f}{\partial x}$ and $\frac{\partial f}{\partial y}$ at the point $(0, 1)$.

Question 4 Find the local maxima, local minima and saddle points of the following functions:

(a) $f(x, y) = x^2 + xy + y^2 + 3x - 3y + 4$

(b) $f(x, y) = x^2 + 12xy + 4y^2$

In each case can you comment if any are global maxima or minma.