Math 131 - Quiz 6

Name _____

November 17, 2021

Score _____

Show all work to receive full credit. Supply explanations when necessary. This quiz is due December 1.

1. (2 points) Let $f(x) = x^3 - 6x^2 + 2x + 3$. Use calculus techniques to find open intervals on which the graph of f is concave up/down. Also identify all points of inflection (both coordinates).

2. (2 points) Sketch the graph of a continuous function having all of the following properties.

   - $f(0) = 0$, $f'(0) = 0$
   - $f'(x) < 0$ on $(-\infty, 0)$
   - $f'(x) > 0$ on $(0, \infty)$
   - $f''(x) > 0$ on $(-1, 1)$
   - $f''(x) < 0$ on $(-\infty, -1) \cup (1, \infty)$

Turn over.

3. (2 points) Find the limit, showing all work. Do not use L'Hôpital's rule.

$$\lim_{x\to\infty}\left(1+\frac{1}{x}\right)\left(\frac{x^2+1}{x^2-1}\right)$$

4. (2 points) Find the horizontal and vertical asymptotes of the graph of $h(x)=\dfrac{2-x^2}{x^2+x}$. Show work or explain your reasoning.

5. (2 points) Use L'Hôpital's rule to find each limit.

   (a) $\lim_{x\to 0}\dfrac{2x}{e^x-1}$

   (b) $\lim_{x\to 1^+}\dfrac{\sin \pi x}{\sqrt{x-1}}$