10. [10 points] Let $m(x)$ be a twice-differentiable function that is defined for all real numbers. Suppose the *only* critical point of $m(x)$ is $x = 0$, and that

$$m''(x) = \frac{x^2(9 - x^4)}{(x^4 + 2)^3}.$$

a. [4 points] Find the intervals of concavity of $m(x)$. That is, find the largest open intervals on which $m(x)$ is concave up, and the largest open intervals on which $m(x)$ is concave down. *Show enough work to fully justify your conclusions.*

Answer: Intervals on which $m(x)$ is **concave up**: _____

Answer: Intervals on which $m(x)$ is **concave down**: _____

b. [1 point] Using your work in part (a), list all inflection points of $m(x)$, separated by commas. *No additional justification necessary.*

Answer: $m(x)$ has inflection points at $x =$ _____

c. [3 points] Using your work above, classify $x = 0$ as a LOCAL MAX of $m(x)$, a LOCAL MIN of $m(x)$, or NEITHER by circling your answer below, or else circle NEI if there is not enough information to tell. *Include a brief justification of your answer.*

LOCAL MAX LOCAL MIN NEITHER NEI

d. [2 points] Find the following limits. Write DNE for any limit that does not exist, even if the limit tends to $\pm\infty$.

i. $\lim_{x\to\infty} m''(x)$

Answer: _____

ii. $\lim_{x\to 0} \frac{m''(x)}{x^2}$

Answer: _____