

Name: \_\_\_\_\_ ID #: \_\_\_\_\_ Section: \_\_\_\_\_

**Q1**(6 points) Let  $f(x) = x^4 + 4x^3 - 4x^2 + 1$ .

- Find the intervals on which  $f$  is increasing or decreasing
- Find the local maximum and local minimum values of  $f$
- Find the intervals of concavity and the inflection points of  $f$

**Q2**(4 points) Find the limit.

$$a) \lim_{x \rightarrow -\infty} x \ln \left( 1 - \frac{1}{x} \right)$$

$$b) \lim_{x \rightarrow 0^+} (1 + \sin 3x)^{1/x}$$