MATH 1A − QUIZ 8

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Name:_____

Instructions: You have 20 minutes to take this quiz, for a total of 10 points. May your luck be concave up!

(1) *(4 points; 1 point each)* Let $f(x) = x^5 - 5x^4$

(a) Find the intervals of increase/decrease
(b) Find the points at which f attains a local maximum/minimum
(c) Find the intervals of concavity and the x-coordinates of the inflection points
(d) Sketch a rough graph of f

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(2) *(3 points; 1.5 points each)* Evaluate the following limits:

(a) $\lim_{x\to 0^+} x\left(\ln(x)\right)^2$

(b) $\lim_{x\to\infty}\left(1+\frac{a}{x}\right)^{bx}$ (here a and b are constants)

(3) *(3 points)* We say that x is a **fixed point** of f if $f(x)=x$

(for example, -1 is a fixed point of x^3 because $(-1)^3=-1$)

Show that if $f'(x)\neq 1$ for all x, then f has at most one fixed point.

Note: Fixed points are really cool! There's a famous fixed point theorem that states that if you shake a snowglobe, there will always be one snowflake that ends up at the same spot it started with. :)