Math 181 Honors Quiz 3 Version A

1. The binomial theorem states that

$$(x_0 + \Delta x)^n = \sum_{k=0}^{n} \binom{n}{k} x_0^{n-k} (\Delta x)^k \qquad \text{where} \qquad \binom{n}{k} = \frac{n!}{k!(n-k)!}.$$

Use the binomial theorem and the method of increments to show that

$$\frac{dy}{dx} = nx^{n-1} \qquad \text{for} \qquad y = x^n.$$

2. State the definition of

$$\lim_{x \to a} f(x) = L$$

in terms of δ and ϵ.

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3. Find the domains of the following functions:

(i) $f(x) = |x+3|$.

(ii) $g(x) = \sqrt{x^2 - 4}$.

(iii) $h(x) = \dfrac{1}{x^2 + x - 6}$.

4. Solve the inequality $|2x + 3| < 15$.