Gateway Exam
Sample 1 from section MT-A142-09           Fall 2003

Turn in your answers with all of your work on the colored paper. Wherever it is appropriate, you should multiply integers, reduce fractions, collect like terms and apply laws of exponents.

On this exam, you are NOT allowed to use calculators.

(1) Find \( f'(x) \) and \( f''(x) \) if \( f(x) = x\sqrt{x} - \ln(18) - 3x^{-4} \).

(2) Find \( g'(x) \) if \( g(x) = x^7 \cos(2x) \).

(3) Find \( \frac{dy}{dx} \) if \( y = x \ln(x^2 + 6) \).

(4) Find \( \frac{dy}{dx} \) and simplify if \( y = \frac{x^4 - 2}{(x^3 + 4)^5} \).

(5) Find \( \frac{dy}{dx} \) implicitly if \( x^3 e^{-y} + 2y = 9x \).

(6) Find \( h'(x) \) if \( h(x) = \sin^{-1}(8x) \).

(7) Find \( \frac{dx}{dt} \) if \( x = \frac{4^t}{t^7} \).

(8) Find \( \frac{dw}{dz} \) if \( w = z^2 \sinh(3z) \cos(2z) \).

(9) Find \( G'(x) \) if \( G(x) = \sinh^{-1}(5x^2) \).

(10) Find \( \frac{dx}{dt} \) if \( x = \csc^3(5t) \).