Term Test C version 2

(1) [8 points] In radioactive-carbon dating, the half-life of ^{14}C is estimated to be 5500 years. If so, the equation

$$W_t = W_0 \cdot 2^{-\frac{t}{5500}}$$

would apply, where W_0 is the original amount of ^{14}C and W_t is the amount of ^{14}C remaining after t years.

Estimate the age of a relic containing 60% of its original ^{14}C.

(2) [8 points] Solve the following two equations:

$$9^x = \frac{27}{3^{x-2}} \qquad \text{in } \mathbb{R}$$

$$\ln x + \ln(x-9) = 1 \qquad \text{in } \mathbb{R}$$

(3) [10 points] Find the slope of the tangent line at the given point.

$$f(x) = \frac{4}{x} + 2\sqrt[3]{x}, x = 8$$

$$g(t) = \frac{2t^2+1}{3t}, t = 2$$

(4) [10 points] Find the first and second derivative of the following functions.

$$f(x) = (x^2 - 5)\ln x^3$$

$$g(s) = 2s^2 + \pi s - 3$$