Term Test A version 2

(1)[8 points] Provide the second derivative of the following two functions in their simplest form.

$$f(x) = 5x - \frac{3}{x-2}$$

$$g(x) = \frac{x^2 \ln x}{2} - \frac{3x^2}{4}$$

(2)[9 points] An aluminum beam was brought from the outside cold into a machine shop where the temperature was held at 70°F. After 10 minutes, the beam warmed to 30°F and after another 10 minutes it was 45°F. Use Newton's law of cooling to estimate the beam's initial temperature.

(3)[5 points] Find the derivative of

$$g(t) = -7e^{t \sin t}$$

(4)[5 points] Evaluate the limit

$$\lim_{x \to 4} \left(\frac{1}{x-4} - \frac{8}{x^2-16} \right)$$

(5)[7 points] Find the domain and the derivative of

$$f(x) = \frac{\ln x}{2 + \ln x}$$

Make sure to simplify the derivative as much as possible.

(6)[8 points] Find the equation of the tangent line to the curve

$$y = \frac{1}{5\cos x + 2\sin x}$$

at the point $(\frac{\pi}{2}, \frac{1}{2})$.

(7)[7 points] The half-life of Palladium-100 is 4 days. You have a sample of 3.26mg. How many days will pass before it is reduced to 1mg?