

**Term Test A version 2**

- (1) [5 points] Evaluate the limit

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

- (2) [8 points] Find the equation of the tangent line to the curve

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

at the point  $(0, \frac{1}{2})$ .

- (3) [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.

- (4) [5 points] Find the derivative of

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

- (5) [7 points] The half-life of Palladium-100 is 4 days. After 20 days a sample of Palladium-100 has been reduced to a mass of 1 mg. What was the initial mass (in mg) of the sample?

- (6) [8 points] Provide the second derivative of the following two functions in their simplest form.

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

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

- (7) [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.