**Dawson College**: **Integral Calculus**: 201-SN3-RE-S2: Winter 2026: **Quiz 3** name: _____

Books, watches, notes or cell phones are **not** allowed. The **only** calculators allowed are the Sharp EL-531**. You **must** show all your work, the correct answer is worth 1 mark the remaining marks are given for the work.

**Question 1.** *(5 marks)* Solve the differential equation

$$\frac{dx}{d\theta} = \frac{e^{2x}\sec^3(5\theta)\tan^3(5\theta)}{x}$$

**Question 2.** *(5 marks)* Find the limit.

$$\lim_{x\to a^+} \cos x \frac{\int_0^{x-a} \ln t \; dt}{\int_a^x \ln(e^t - e^a)\; dt}$$

**Question 3.** *(5 marks)* Determine whether each integral is convergent or divergent. Evaluate those that are convergent.

$$\int_{-\infty}^{\infty} \frac{x^2}{9+x^6}\,dx$$

**Question 4.** *(5 marks)* Find the values of $p$ for which the integral converges and evaluate the integral for those values of $p$.

$$\int_{1}^{e} \frac{1}{x(\ln x)^p}\,dx$$