Math 131 - Quiz 12

May 6, 2026

Name key

Score _____

Show all work to receive credit. Supply explanations where necessary. This quiz is due Monday, May 11.

1. (3 points) Evaluate each limit.

(a) $\lim_{x\to 1} \dfrac{\sin(\ln x)}{x-1}$ $\quad 0/0$ } L'HÔPITAL

$$= \lim_{x\to 1} \frac{\cos(\ln x)\,\frac{1}{x}}{1} = \frac{\cos(0)\,(1)}{1} = \boxed{1}$$

(b) $\lim_{x\to 0^+} x\ln(x^4)$ $\quad 0\cdot(-\infty)$ L'HÔPITAL

$$= \lim_{x\to 0^+} \frac{4\ln x}{\frac{1}{x}} = \lim_{x\to 0^+} \frac{\frac{4}{x}}{-\frac{1}{x^2}} = \lim_{x\to 0^+} (-4x) = \boxed{0}$$

2. (3 points) Let $f(x) = x\cos(\pi x)$. Use 4 subintervals of equal length and left subinterval endpoints to compute the corresponding Riemann sum for f over $[1,2]$.

$\Delta x = 0.25$

$1 < 1.25 < 1.5 < 1.75 < 2$

$c_1 = 1$

$c_2 = 1.25$

$c_3 = 1.5$

$c_4 = 1.75$

Riemann sum =

$$0.25\left[f(1) + f(1.25) + f(1.5) + f(1.75)\right]$$

$$= \frac{1}{4}\left(-1 - \frac{5}{8}\sqrt{2} + 0 + \frac{7}{8}\sqrt{2}\right)$$

$$= \frac{1}{4}\left(\frac{1}{4}\sqrt{2} - 1\right) = \boxed{\frac{\sqrt{2}}{16} - \frac{1}{4}}$$

≈ -0.16

Turn over.

3. (2 points) Find the function $v(t)$ that satisfies

$$v'(t) = 9t^2 - 4t + 5, \qquad v(-1) = 0.$$

$$V(t) = \int (9t^2 - 4t + 5)\, dt = 3t^3 - 2t^2 + 5t + C$$

$$V(-1) = 0 \Rightarrow 3(-1)^3 - 2(-1)^2 + 5(-1) + C = 0$$

$$-10 \qquad -10 + C = 0 \Rightarrow C = 10$$

$$V(t) = 3t^3 - 2t^2 + 5t + 10$$

4. (2 points) Evaluate the indefinite integral.

$$\int \left(\frac{1}{x^2} - \sqrt{x} + \frac{2}{x} + 5\sin x\right) dx$$

$$= \int \left(x^{-2} - x^{1/2} + \frac{2}{x} + 5\sin x\right) dx$$

$$= -1x^{-1} - \frac{2}{3}x^{3/2} + 2\ln|x| - 5\cos x + C$$

$$= \boxed{\frac{-1}{x} - \frac{2}{3}x^{3/2} + 2\ln|x| - 5\cos x + C}$$