

KFUPM SEM I (Term 081) Name: _____ Serial #: _____
MATH 102-3-4 Quiz # 1 ID: #: _____ Sec. #: _____

1. (2-points) Express the limit $\lim_{n \rightarrow \infty} \left(\frac{2}{n} \sum_{i=1}^n \sqrt{1 + \left(\frac{3i}{n} \right)^2} \right)$ as a definite integral.

2. (3-points) Find the Riemann sum R_3 for $f(x) = \sin \frac{x}{2}$, $0 \leq x \leq 3\pi$ with three equal subintervals, taking the sample points to be **midpoints**.

3. (3-points) If f is a continuous function such that

$$\int_{\pi/4}^x (\sin t) f(t) dt = 3 \sin x + 4 \cos x + 5, \quad \frac{\pi}{4} \leq x \leq \frac{\pi}{2},$$

find $f(x)$.

4. (3-points) Show that $4 \leq \int_0^2 \sqrt{3x^2 + 4} \, dx \leq 8$. (show your steps).

5. (4-points) Use the definition of the definite integral **as a limit of a sum** to evaluate

$$\int_0^2 (5 + 3x) \, dx.$$

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1. (2-points) Express the limit $\lim_{n \rightarrow \infty} \frac{3}{n} \sum_{i=1}^n \sqrt{\left(\frac{4i}{n}\right)^2 + 1}$ as a definite integral.
2. (3-points) Find the Riemann sum R_3 for $f(x) = \cos \frac{x}{2}$, $0 \leq x \leq 3\pi$ with three equal subintervals, taking the sample points to be **midpoints**.
3. (3-points) If f is a continuous function such that
- $$\int_{\pi/4}^x (\cos t)f(t) dt = 7 \cos x + 8 \sin x - 11, \quad \frac{\pi}{4} \leq x \leq \frac{\pi}{2},$$
- find $f(x)$.

4. (3-points) Show that $6 \leq \int_0^2 \sqrt{4x^2 + 9} \, dx \leq 10$. (show your steps).

5. (4-points) Use the definition of the definite integral **as a limit of a sum** to evaluate

$$\int_0^2 (2x + 3) \, dx.$$