Quiz: 1 Math 102 Semester: 172 Duration: 45 minutes

Full Name: ID:

Q1. Given that $\int_1^3 f(3x+1)\,dx = 9$ and $\int_2^5 f(2x)\,dx = 8$. Find $\int_2^4 f(x)\,dx$

Q2. Estimate the area under the graph of $f(x) = x - \ln x^2$ for $1 \leq x \leq 7$, using three rectangles and taking the sample points to be the midpoints.

Q3. Evaluate

$$a) \int_0^5 f(x)\,dx \quad \text{where} \quad f(x) = \begin{cases} 1 - x & \text{for } \ 0 \le x \le 1 \\ -\sqrt{4 - (x-3)^2} & \text{for } \ 1 \le x \le 5 \end{cases}$$

$$b) \int_{-3}^{3} (x \sin^2 x + \cos^2 x)\,dx \quad c) \int \tan^2 x\,dx \quad d) \int \sqrt{\frac{5x-1}{x^5}}\,dx$$

Q4. If $f(x) = \int_0^{\sin x} \sqrt{1+t^2}\, dt$ and $g(y) = \int_3^y f(x)\, dx$, then find $g''(\pi/6)$.

Q5. The velocity function for a particle moving along a line is $v(t) = t^2 - 2t - 8$ (m/s). Find the distance traveled by the particle during the time interval $[1, 6]$.

Q6. Determine a region whose area is equal to $\lim_{n\longrightarrow\infty}\sum_{k=1}^{n}\frac{4\pi}{n}\tan\left(1+\left(\frac{k\pi}{4n}\right)^2\right)$.