Calculus 30L - Average Value / Riemann Sum Asn't

Name: ____________

1. What is the average value of $y = x^2\sqrt{x^3+1}$ on the interval $[0, 2]$?

(A) $\frac{26}{9}$ (B) $\frac{52}{9}$ (C) $\frac{26}{3}$ (D) $\frac{52}{3}$ (E) 24

2. The function f is continuous for all real numbers, and the average rate of change of f on the closed interval $[6, 9]$ is $-\frac{3}{2}$. For $6 < c < 9$, there is no value of c such that $f'(c) = -\frac{3}{2}$. Of the following, which must be true?

(A) $\frac{1}{3}\int_6^9 f(x)\,dx = -\frac{3}{2}$

(B) $\int_6^9 f(x)\,dx$ does not exist.

(C) $\frac{f'(6) + f'(9)}{2} = -\frac{3}{2}$

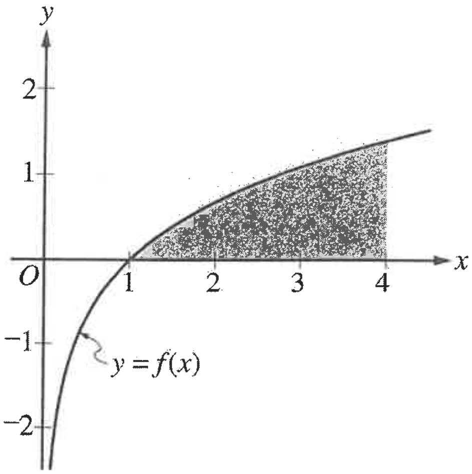
(D) $f'(x) < 0$ for all x in the open interval $(6, 9)$.

(E) f is not differentiable on the open interval $(6, 9)$.

t (minutes)	0	5	10	15
$R(t)$ (people per minute)	100	100	75	55

3. During an evacuation drill, people leave a building at a rate of $R(t)$ people per minute, where t is the number of minutes since the start of the drill. Selected values of $R(t)$ are shown in the table above. Using a right Riemann sum with three subintervals and data from the table, what is the approximation of the number of people who leave the building during the first 15 minutes of the evacuation drill?

(A) 230 (B) 1150 (C) 1375 (D) 2075



4. The function f is given by $f(x) = \ln x$. The graph of f is shown above. Which of the following limits is equal to the area of the shaded region?

(A) $\lim_{n\to\infty} \sum_{k=1}^{n} \left(1 + \ln\left(\frac{3k}{n}\right)\right)\frac{3}{n}$

(B) $\lim_{n\to\infty} \sum_{k=1}^{n} \ln\left(1 + \frac{3k}{n}\right)\frac{3}{n}$

(C) $\lim_{n\to\infty} \sum_{k=1}^{n} \ln\left(\frac{4}{n}\right)\left(1 + \frac{4k}{n}\right)$

(D) $\lim_{n\to\infty} \sum_{k=1}^{n} \ln\left(1 + \frac{4k}{n}\right)\frac{4}{n}$

5. The definite integral $\int_0^4 \sqrt{x}\, dx$ is approximated by a left Riemann sum, a right Riemann sum, and a trapezoidal sum, each with 4 subintervals of equal width. If L is the value of the left Riemann sum, R is the value of the right Riemann sum, and T is the value of the trapezoidal sum, which of the following inequalities is true?

(A) $L < \int_0^4 \sqrt{x}\, dx < T < R$

(B) $L < T < \int_0^4 \sqrt{x}\, dx < R$

(C) $R < \int_0^4 \sqrt{x}\, dx < T < L$

(D) $R < T < \int_0^4 \sqrt{x}\, dx < L$

6. If $\int_0^3 f(x)\,dx = 6$ and $\int_3^5 f(x)\,dx = 4$, then $\int_0^5 (3 + 2f(x))\,dx =$

(A) 10 (B) 20 (C) 23 (D) 35 (E) 50