

MATH 131:501 Exam 3 practice

Your name: _____

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Problem 1: Let $f(x)$ be a differentiable function on \mathbb{R} . Some values of $f'(x)$ are given in the table below.

x	0	1	2	3	4
$f'(x)$	0	5	6	3	1

Assuming $f(0) = 0$, approximate $f(4)$.

Problem 2: Let $f(x) = e^{x^2}$.

1. Approximate the area under the graph of f on $[0, 2]$ by a **right** Riemann sum with 7 equally-spaced rectangles.
2. Approximate the area under the graph of f on $[0, 2]$ by a **left** Riemann sum with 7 equally-spaced rectangles.
3. Which of these is an over / underestimate? Justify your answer.

Problem 3: Find the area under the curve $f(x) = \sin(x)$ for x between 0 and π .

Problem 4: the velocity of a particle at time t , in seconds, is given by $f(t) = t^3$, in m/s . Find the net change in position...

1. ... when t goes from 0 to 2
2. if $p(t)$ is the function that gives the position, what is $p'(3)$?

Problem 5: Let $F(T)$ be the area under the curve of $f(t) = t^2$ from $t = 0$ to $t = T$. For T between 0 and 4, where is F changing the fastest?

Problem 6: Find the indefinite integrals:

$$\int 5x^3 + \cos(x) + 3dx =$$
$$\int \sin(x^2)2xdx =$$
$$\int \frac{1}{x} + \frac{1}{x^2} + \sqrt{x} =$$

Problem 7: What is the largest (by area) isosceles triangle with perimeter 30?

Problem 8: Let $f(x) = 4x^7 - 35 \cdot 7x^4 + 27 \cdot 8 \cdot 28x$ be a function on the interval $[1.5, 4]$.

1. Find all the critical points, classify them as local minima/maxima.
2. Where is f increasing / decreasing?
3. Where is f concave up/down?
4. where are the points of inflection?
5. What is the global minimum / maximum of f on $[1.5, 4]$?

Problem 9: Let $f(x)$ be a differentiable function on \mathbb{R} . Given that $f''(x) = 12x + 2$, $f(0) = 1$, and $f(1) = 3$, find f .