

Midterm #3

Please print your name:

Besides the allowed calculator, no notes or tools of any kind are permitted.

There are 25 points in total.

Good luck!

Problem 1. (4 points) Compute the following indefinite integrals.

[No need to show work here.]

(a) $\int [x^4 - 2x^2 + 7] dx =$

(b) $\int \left(\frac{1}{\sqrt{x}} + \frac{1}{x^3} \right) dx =$

(c) $\int \frac{1}{1+x^2} dx =$

(d) $\int [\sin(4x) + 3e^{2x}] dx =$

Problem 2. (2 points) Compute $\int_1^2 x^2 dx$.

[Show your work!]

Problem 3. (2 points) Compute $\int_1^3 \frac{1}{x} dx$.

[Show your work!]

Problem 4. (2 points) Compute: $\lim_{x \rightarrow 0} \frac{\sin(3x)}{e^{2x} - e^{7x}}$

[Show your work!]

Problem 5. (2 points) Compute: $\lim_{x \rightarrow 0^+} x^2 \ln(x)$.

[Show your work!]

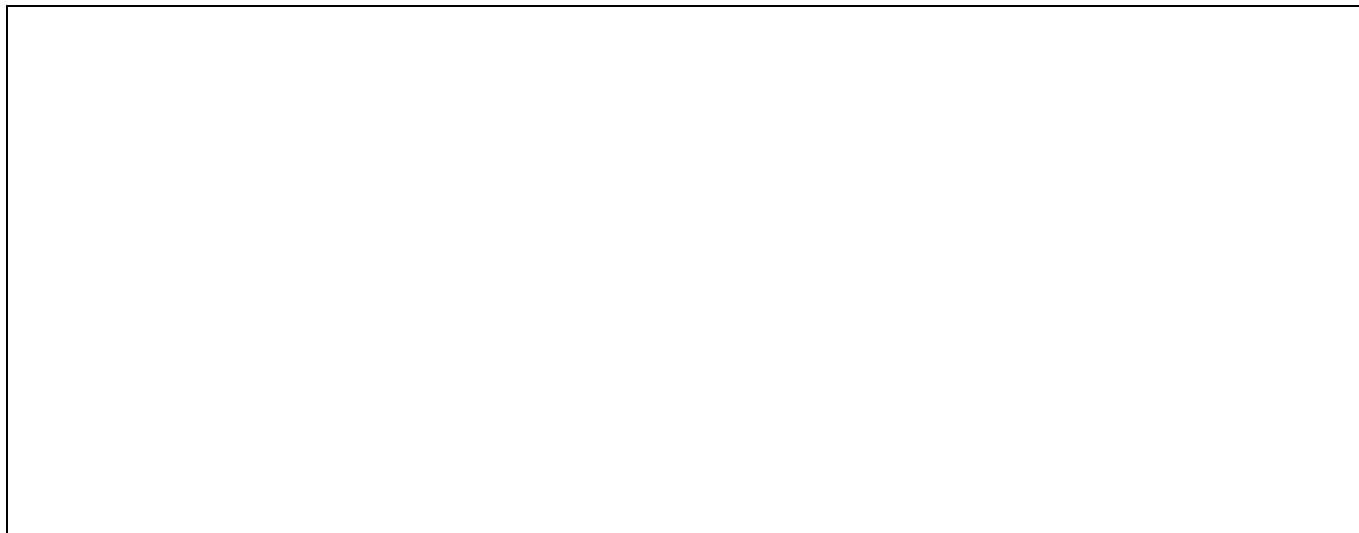
Problem 6. (2 point) Compute: $\sum_{k=2}^4 \frac{(-2)^k}{k-1}$

[Show your work!]

Problem 7. (3 points) Let A be the (net) area between the x -axis and $f(x)$ for x in $[1, 5]$.

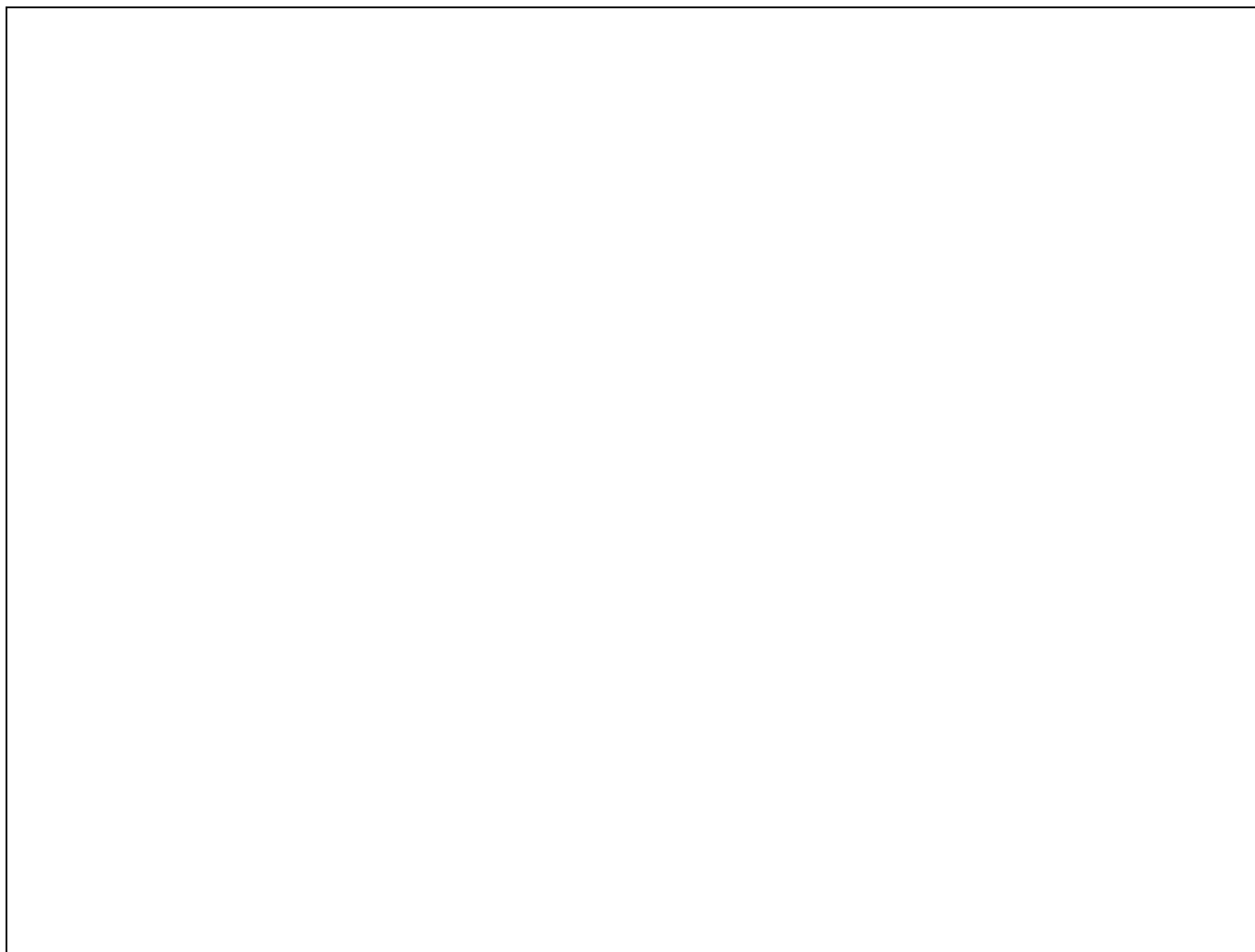
- (a) Write down a Riemann sum for A using 3 intervals (of equal size) and midpoints.
- (b) Using sigma notation, write down a Riemann sum for A using n intervals (of equal size) and midpoints.

Problem 8. (4 points) Suppose you have 100 m of fencing and want to fence off a rectangular field that borders a straight river (no fence is needed alongside the river). What is the maximum area you can fence off?



Problem 9. (4 points)

- (a) Estimate the average value of $f(x) = x^2$ on $[0, 2]$ using a Riemann sum with 3 intervals and midpoints.
- (b) Compute the (exact) average value of $f(x) = x^2$ on $[0, 2]$.



(extra scratch paper)