1. (25 pts) Express \( \lim_{n \to \infty} \sum_{i=1}^{n} [4(x_i)^3 - 2\sqrt{x_i}^3 + 8x^r] \Delta x \) as an integral on the interval \([1, 25]\). Do not evaluate.

\[
\int_{1}^{25} (4x^5 - 2\sqrt{x}^3 + 8x^r) \, dx
\]

2. (25 pts) What is the most general antiderivative \( F \) of \( f(x) = \sec^2 x - \frac{7}{x} + 2^x - \sqrt{x} \)?

\[
F = \tan x - 7 \ln |x| + \frac{2^x}{\ln 2} - \frac{2}{3} x^{\frac{3}{2}} + C
\]
3. (25 pts) Let $A$ be the region that lies under the graph (between $f$ and the $x$-axis) of $f(x) = \frac{1}{4}x^2 - \frac{1}{2}x - 2$ between $x = 1$ and $x = 7$.

a. (8pts) Graph $f$. Draw the appropriate rectangles corresponding to $L_3$ for the region $A$.

![Graph of function and rectangles](image)

b. (8pts) Exactly calculate $L_3$.

$$L_3 = 2 \left[ f(1) + f(3) + f(5) \right]$$
$$= 2 \left[ -2.25 + -1.25 + 1.75 \right]$$
$$= -3.5$$

c. (5 pts) Represent the region $A$ as a definite integral. Do not evaluate.

$$\int \left( \frac{1}{4}x^2 - \frac{1}{2}x - 2 \right) \, dx$$

d. (4 pts) Does the definite integral from part c represent the (circle one)

i. area of $A$

ii. the net area of $A$

iii. the negative of the area of $A$?

NAME: _______________________

MATH 131 SECTION (Circle one):

504  505  506

Circle First Letter of Last Name:

A-D  E-K  L-R  S-Z