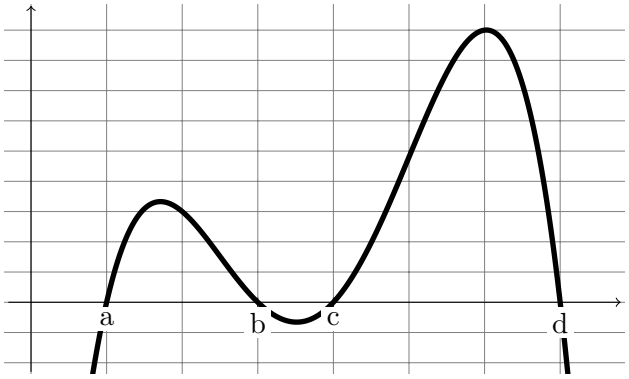
Name: _____

Directions: Show all work. No credit for answers without work.

1. [**2 points**] Use the left hand sum with $n = 3$ to estimate $\int_2^8 \frac{x}{x-1}\,dx$.

2. [**2 points**] The graph of $f(x)$ is displayed below. Use the graph to list the following integrals in order from smallest to largest.



I. $\int_a^b f(x)\,dx$ II. $\int_b^c f(x)\,dx$ III. $\int_c^d f(x)\,dx$ IV. $\int_a^c f(x)\,dx$ V. $\int_a^d f(x)\,dx$

3. [**1 point**] In terms of the units of $f(x)$ and x, what are the units of $\int_a^b f(x)\,dx$?

4. [**2 points**] A gasoline pump is activated. After t minutes, the pump dispenses gasoline at a rate of $2t$ gallons per minute. Find exactly how much gasoline has been pumped after 4 minutes.

5. [**3 points**] Evaluate the following indefinite integrals.

(a) $\int 6\,dx$

(b) $\int \frac{4}{x^2}\,dx$

(c) $\int e^{3x}\,dx$

(d) $\int 3x^2 + 5x\,dx$

(e) $\int \sqrt{x}\,dx$

(f) $\int (x+1)^2\,dx$