

4. (10 points) Give the definition of the improper integral  $\int_1^{\infty} \frac{1}{x^{3/2}} dx$ . Then use your definition to evaluate the integral if it converges, or else show it diverges.

5. (12 points). Evaluate the integrals, given that  $f(x)$  is a continuous function for  $0 \leq x \leq 6$  with the following properties:

$$f(0) = 2, \quad f(2) = 3, \quad f(4) = -1, \quad f(6) = 5; \quad f'(0) = 1, \quad f'(2) = 4;$$
$$\int_0^2 f(x) dx = 3, \quad \int_2^4 f(x) dx = 1, \quad \int_4^6 f(x) dx = 6.$$

(a)  $\int_0^2 x f'(x) dx =$  \_\_\_\_\_.

(b)  $\int_2^4 f'(x)(2 + 3f(x)) dx =$  \_\_\_\_\_.

(c)  $\int_0^2 f(3x) dx =$  \_\_\_\_\_.