

Unit 8 Practice

1. Find the limit using L'Hopital's Rule:

a) $\lim_{x \rightarrow 0} \frac{3\sin 2x}{2x}$

b) $\lim_{x \rightarrow \pi} \frac{1 - \cos 2x}{x^2 - \pi^2}$

2. Find $f'(x)$.

a) $f(x) = \tan^{-1}\sqrt{x}$

b) $f(x) = \sec^{-1}(3x^2)$

3. Integrate each.

$$\int \frac{dx}{16 + 81x^2}$$

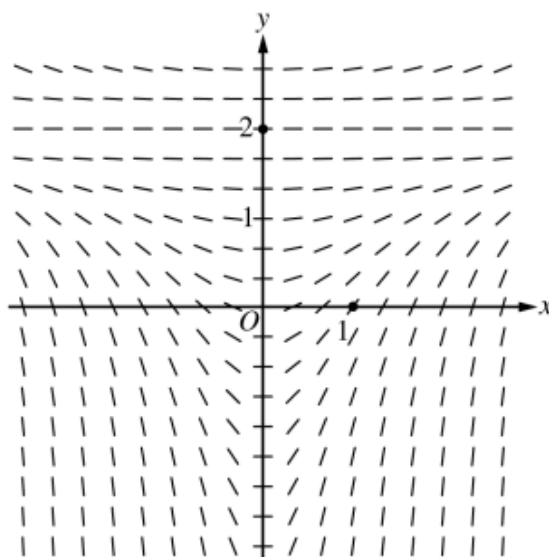
$$\int \frac{x^2}{\sqrt{4 - x^6}} dx$$

4. The velocity of a particle over $0 \leq t \leq 30$ seconds is shown in the table. Using a **midpoint** Riemann sum with 5 rectangles, find the approximate value of $\int_0^{30} v(t) dt$.

t	0	3	6	9	12	15	18	21	24	27	30
$v(t)$	0	7.5	10.1	12	13	13.5	14.1	14	13.9	13	12.2

Consider the differential equation $\frac{dy}{dx} = \frac{1}{3}x(y - 2)^2$.

- (a) A slope field for the given differential equation is shown below. Sketch the solution curve that passes through the point $(0, 2)$, and sketch the solution curve that passes through the point $(1, 0)$.



- (b) Let $y = f(x)$ be the particular solution to the given differential equation with initial condition $f(1) = 0$. Write an equation for the line tangent to the graph of $y = f(x)$ at $x = 1$. Use your equation to approximate $f(0.7)$.
- (c) Find the particular solution $y = f(x)$ to the given differential equation with initial condition $f(1) = 0$.