

Assignment 6-2

Evaluate (integrate) in Problems 1-8.

$$1. \int 3(3x-2)^5 dx \quad 2. \int (5t-3)^8 dt \quad 3. \int \frac{x^2}{\sqrt{4-x^3}} dx \quad 4. \int \sqrt{y^2-3} y dy$$

$$5. \int \frac{5x^2}{(x^3+2)^6} dx \quad 6. \int \frac{-3}{\sqrt{1-v}} dv \quad 7. \int (2x^2-3x)^4 (4x-3) dx \quad 8. \int \frac{x-1}{(2x^2-4x)^5} dx$$

Evaluate (integrate) in Problems 9-20.

$$9. \int \frac{(\sqrt{t}-4)^{10}}{\sqrt{t}} dt \quad 10. \int \frac{1}{\sqrt[3]{5x}} dx \quad 11. \int (2u+1)^2 du \quad 12. \int y^3 \left(y - \frac{1}{y} \right) dy$$

$$13. \int \frac{x^2-3}{x^2} dx \quad 14. \int \frac{3x^2+x-2}{\sqrt{x}} dx \quad 15. \int \left(2 + \frac{1}{x} \right)^4 \frac{1}{x^2} dx \quad 16. \int \pi \sin(\pi\theta) d\theta$$

$$17. \int \frac{\cos \frac{1}{x}}{x^2} dx \quad 18. \int \sec(2x-1) \tan(2x-1) dx \quad 19. \int \tan^5 \theta \sec^2 \theta d\theta \quad 20. \int \frac{\csc^2 t}{\cot^4 t} dt$$

Use u -substitution to evaluate in Problems 21-23.

$$21. \int 30x\sqrt{x+1} dx \quad 22. \int \frac{3x-5}{\sqrt{\frac{1}{2}x-1}} dx \quad 23. \int (5x-8)\sqrt{1-x} dx$$

24. If $f''(x) = x^{-\frac{4}{3}}$, $f'(8) = \frac{3}{2}$, and $f(27) = 5$, find $f(x)$.

25. The derivative of a function is $\frac{dy}{dx} = 6x\sqrt{x^2-3}$. Find the function if $(2, 5)$ is a point on the graph of the function.

26. If $f'(x) = \cos(3x)$ and $f\left(\frac{\pi}{6}\right) = 2$, find $f(x)$.

27. Evaluate $\frac{d}{dx} \int (x^2-3)^4 dx$.

28. The velocity of a particle moving along a vertical line is given by the equation $v(t) = \left(\frac{1}{3}t-1\right)^2$.

The particle's position at time zero is 4.

a. Find an equation for the particle's acceleration $a(t)$.b. Find an equation for the particle's position $y(t)$.c. At what time(s) is the particle at rest?

d. At what time(s) is the particle moving upward?

e. For what value(s) of t does the particle's speed equal the particle's velocity?f. Find the total distance traveled by the particle from $t = 3$ to $t = 9$.

g. Find the interval(s) of time for which the speed of the particle is increasing

29. Find equations for the lines tangent to and normal to the graph of $y = \sqrt{3x-5}$ when $x = 2$.

30. Find the instantaneous rate of change for $f(t) = \frac{t}{t+1}$ when $t = 1$.

31. Find the average rate of change for $f(t) = \frac{t}{t+1}$ on $[0, 2]$.

32. Which of the rates of change from Problems 30 and 31 represents:

a. the slope of a secant line for the graph of $f(t)$?b. the slope of a tangent line for the graph of $f(t)$?

33. Find the value of c in $[0, 2]$ such that $f'(c)$ = the average rate of change of $f(t) = \frac{t}{t+1}$ on $[0, 2]$. It is at this t -location that the slopes of what two lines are the same? (MVT).