

Math 271
Integration

Solve:

1. $\int (5x^4 - 4x^3 + 3x^2 - 2x) dx$

2. $\int \frac{5x^3 - 4x^2 + 2}{2x^2} dx$

3. $\int \frac{4x}{(6 - 9x^2)^4} dx$

4. $\int \sec(3x)\tan(3x) dx$

5. $\int \sqrt{x}(x^2 - 2x) dx$

6. $\int x(\sqrt[3]{x+1}) dx$

7. $\int \sin^3 x \cos x dx$

8. $\int_0^6 |x - 2| = \text{setup only}$

9. If $\int_{-3}^4 f(x) = 8$ and $\int_4^8 f(x) = -5$, then find $\int_{-3}^8 f(x) dx$ and $\int_8^4 f(x) dx$.

10. Find a function whose graph passes through the point $(-1, 1)$ whose derivative is $f'(x) = x^2 - x$

11. On your calculator, evaluate: $\sum_{i=1}^4 (i^2 + 4) =$

12. Find the limit of $s(n)$ as $n \rightarrow \infty$ if $s(n) = \frac{81}{n^4} \left[\frac{n^2(n+1)^2}{4} \right]$

13. Use the Second Fundamental Theorem of Calculus to find $F'(x)$ if $F(x) = \int_0^x t \cos t dt$ and

$$F(x) = \int_0^x \sqrt{t} dt.$$

14. Explain the basic difference in using Riemann Sums, Trapezoidal Rule, and Simpson's Rule to calculate the area between a function and the x-axis.

15. Setup the definite integral that yields the area of the region with the boundaries of $y = x^2 - x$, $y = 0$, and $x = 4$; then use a calculator to evaluate the integral.

16. Find the average value of $f(x) = 2x^2 + 3$ on the interval $[4, 8]$.

17. On the moon, the acceleration due to gravity is -1.6m/s^2 . A stone is dropped from a cliff on the moon and hits the surface of the moon 30 seconds later. How far did it fall?