

1. (10) Compute

$$\int 5x^4 + \frac{1}{x^2} dx.$$

2. (10) Compute $\int \cot x \csc x dx$.

3. (10) Compute

$$\int_0^{\pi} \cos^3 x \sin x dx.$$

4. (10) Compute

$$\int 2x\sqrt{x-1}dx.$$

5. (10) Compute

$$\int_0^3 \left[\frac{d}{dx} (\sqrt{4+x^2}) \right] dx.$$

6. (15) Find the area between $y = x^2$ and $y = x + 6$.

7. (15) An object moves along a coordinate line with velocity $v(t) = 6t^2 - 6$ units per second. Find the total distance traveled by the object during the first 3 seconds.

8. (10) Given the acceleration $a(t) = 2 + 6t$, the initial velocity $v_0 = 0$, the initial position $x_0 = 1$, compute the position $x(t)$.

9. (10) Let

$$F(x) = \int_{x^2}^{x+1} \frac{1}{1+t^2} dt$$

Find $F'(x)$.

10. (Bonus) Compute $\int_0^{\frac{\pi}{3}} \sin^2 x dx$.