

1. Find the derivative of $f(x) = x^3 3^x$

2. Find the indefinite integral $\int \frac{2^{\frac{-1}{t}}}{t^2} dt$

3. Evaluate the expression. Show all of your work.

a. $\sin(\arctan(2))$

b. $\cot(\arccos(\frac{\sqrt{3}}{2}))$

4. Find the derivative of the function $y = \sqrt{x^2 - 4} - 2\arccos(\frac{x}{2})$, $2 < x < 4$

5. Solve the differential equation $x^2 + 5yy' = 0$
6. For the isotope ^{239}Pu , the half-life is 24,100 years. After 10,000 years we find that there is 0.4 g remaining. How much was there originally ($t=0$)? How much was there after 1,000 years?
7. Find the area of the region by integrating with respect to x . The region is bounded by $y = 4 - x^2$ and $y = -x - 2$

8. Use the disc/washer method to set up and evaluate the integral that gives the volume of the solid formed by revolving the region about the y -axis.

a. $y = 1$

b. $x = 0$

c. $x = -y^2 + 4y$

9. Use the disc/washer method to set up and evaluate the integral that gives the volume of the solid formed by revolving the region about the y -axis.

a. $y = 2x^2$

b. $y = 0$

c. $x = 2$

10. Use the disc/washer method to set up and evaluate the integral that gives the volume of the solid formed by revolving the region about the line $y=8$.

a. $y = 2x^2$

b. $y = 0$

c. $x = 2$