

1. Compute the following integrals

(a) $\int \frac{\cos x}{\sin^2 x - 4 \sin x + 7} dx.$

(b) $\int x \sin^2 x \cos x dx$

2. In 2000 there are 5000 wolves. In the absence of hunting the wolf population would increase at a rate of %1 per year. However, hunters are killing wolves at a steady rate of 100 wolves per year. When will the wolf population die out? (*answer* = 2069)

3. The region between the curve $y = e^{x^3}$ and the lines $y = 0$, $x = 1$ and $x = t$ is rotated about the vertical line $x = 1$. Here $t > 1$ is not further specified.

(a) Write (but DO NOT evaluate) the integral for the volume of the resulting solid.

(b) Let $V(t)$ denote the volume found in (a). Compute $V'(2)$.