1) The Present Value (PV) of an investment that pays out income continuously at a rate R(t) for T years is described by the integral PV below. Find the PV, if R(t) =5000+100t ($/year) with r=0.05 and T= 10 years.
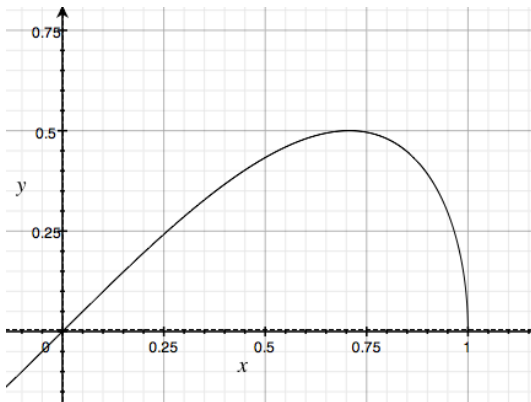
$$PV = \int_0^T R(t)e^{-rt}dt$$

2) Determine the area enclosed by $y = \ln x$ and $y = (\ln x)^2$

3) $\int e^{\sqrt{x}}dx$

4) Calculate $\lim\limits_{x \to \infty}\left(1 + \dfrac{4}{x}\right)^{3x}$

5) Find the volume of the solid obtained by rotating the curve about the y-axis over [0,1].

$$y = x\sqrt{1 - x^2}$$

6) Prove $\int_{-\pi}^{\pi} \sin(mx)\sin(nx)dx = \begin{cases} 0, & m \neq n \\ \pi, & m = n \end{cases}$

7) $\int \sqrt{x^2 - 4x + 3}dx$