

Answer the problems on separate paper. You do not need to rewrite the problem statements on your answer sheets. Do your own work. Show all relevant steps which lead to your solutions. Retain this question sheet for your records.

1. Match the following functions with their graphs:

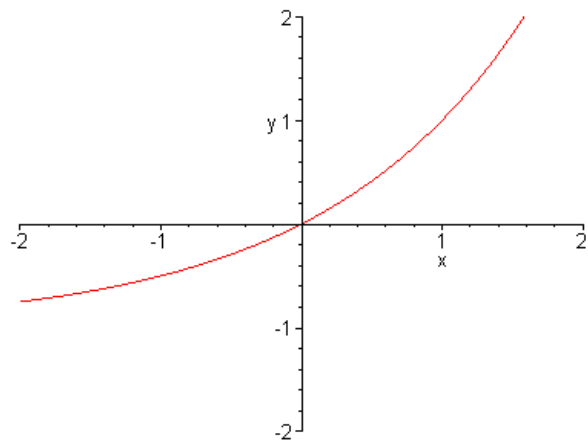
i) $y = \ln(x+1)$

ii) $y = 2^{-x-1}$

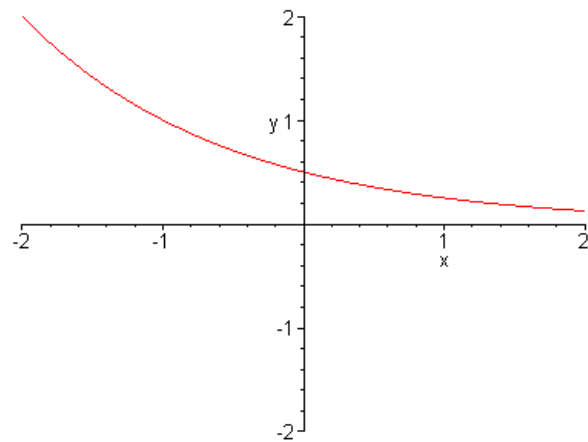
iii) $y = \frac{x}{x+1}$

iv) $y = 2^x - 1$

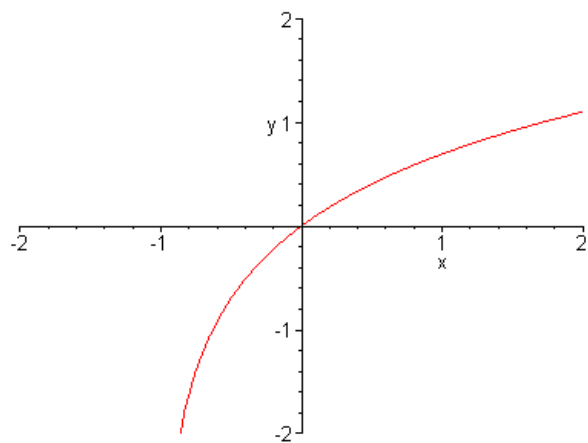
a) Graph A



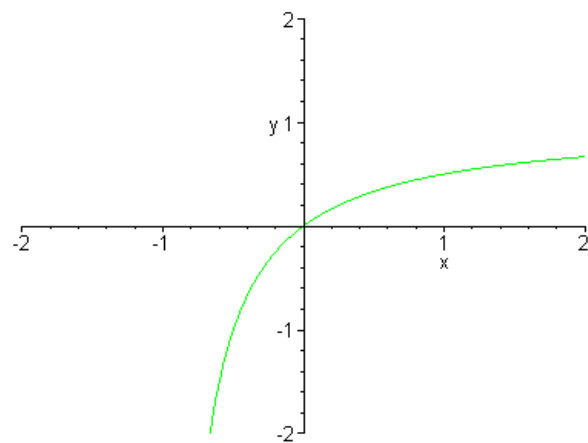
b) Graph B



c) Graph C



d) Graph D



2. Find the absolute maximum and minimum of $y = 4x^2 e^{-x^2/2}$ on $[0,3]$.

3. Find y' for

$$(a) y = \frac{1+t^2 \ln t}{t^2} \quad (b) y = \frac{e^{-t}}{2} (\sin t - \cos t)$$

4. Evaluate the following integrals

$$(a) \int \frac{dx}{x+x \ln(2x)} \quad (b) \int_{\ln 4}^{\ln 9} e^{-x/2} dx$$

5. Evaluate the following limits

$$(a) \lim_{x \rightarrow 0} \frac{x^2}{\ln(\sec x)} \quad (b) \lim_{x \rightarrow 0} \left(\frac{1}{x} - \frac{1}{\ln(x+1)} \right)$$

6. The half-life of radon-222 is 3.85 days. If after a week, the strength of the sample (the measured level of radioactive decay per unit mass) is 4.5 hundred thousand neutrons per second, what was the initial strength of the sample?