Solve the following mathematical problems.

Obtain:

$$\int e^x \cos(x)$$

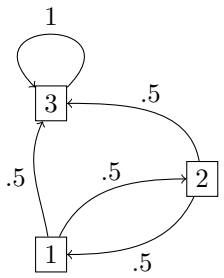
Answer: $\frac{e^x}{2}\sin(x) + \frac{e^x}{2}\cos(x)$

Obtain:

$$\lim_{x \to 1} \frac{x^4 - 1}{x^2 - 1}$$

Answer: 2

What is the long run stationary distribution of the following discrete time Markov chain:



Answer: $(0, 0, 1)$

Minimize: $4x + 12y$
subject to:

$$\begin{aligned} x &\geq 0 \\ y &\geq 0 \\ 5x - y &\geq 2 \\ x + 2y &\leq 1 \end{aligned}$$

Answer: $(x, y) = \left(\frac{5}{11}, \frac{3}{11}\right)$