1. (10 pts) Find the solution of the differential equation that satisfies the given initial condition.

(a) $\dfrac{dy}{dx} = xy^2,\ y(0) = -2$

(b) $\dfrac{dy}{dx} = e^y,\ y(0) = 0$

2. (10 pts) Determine whether the sequence converges or diverges. If it converges, find the limit.

(a) $a_n = \dfrac{n^2 + 1}{n^2 + n}$

(b) $a_n = \dfrac{\sin n}{n}$

(c) $a_n = \dfrac{2^n}{n!}$