Circle True or False or leave blank. (1 point for correct answer, -1 for incorrect answer, 0 if left blank)

1. True   False   The partial fraction decomposition of $\frac{1}{(x^2+1)^3}$ is $\frac{A}{x^2+1} + \frac{B}{(x^2+1)^2} + \frac{C}{(x^2+1)^3}$.

2. True   False   We can use the method of separable equations to solve $r'(s) = e^{r-s}$.

Show your work and justify your answers. Please circle or box your final answer.

3. (10 points) (a) (6 points) Population growth of flowers is given by the differential equation $\frac{dP}{dt} = P(2 - P)$. What is the general solution for P? You do not have to explicitly solve for P.

(b) (2 points) What is the particular solution with the initial condition $P(1) = 1$?

(c) (2 points) Suppose now that population growth is depends on the season and is given by the differential equation $\frac{dP}{dt} = P(2 - P)\cos t$. What is the general solution for P? You do not have to explicitly solve for P. (Hint: try to reuse some of your calculations from part (a))