1. Classify each of the following DEs as separable, exact, linear, homogeneous, or Bernoulli. Do not solve.

(a) $y\left(x + 2y^3\right) dx = 6x^2 dy$ (b) $(\cos x \cos y - e^x \cot x) dx - \sin x \sin y\, dy = 0$

(c) $\left(x^2 + \sin x\right) dx + \left(x^2 y^2 - 4x^2\right) dy = 0$ (d) $\left(x \csc\left(y/x\right) - y\right) dx + 5x\, dy = 0$

2. In an experiment, a bacterial population, P has rate of growth proportional to P and is initially P_0. If the population has tripled after 2 hours, how long will it take it to be 10 times its initial value?