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

(a) $(2x + \tan y)\, dx - (y^2 - x \sec^2 y)\, dy = 0$ (b) $(6y^3 - xy - y)\, dx + 2x\, dy = 0$

(c) $(xy - 3x^2 y)\, dx + e^{x-3y}\, dy = 0$ (d) $(x \ln x - x \ln y)\, dx + 3\,(x - 2y)\, dy = 0$

2. A radioactive substance decays at a rate proportional to the amount present P. It was found that 20% of the substance disappears after 25 years. How long will it take for half the amount to disappear?