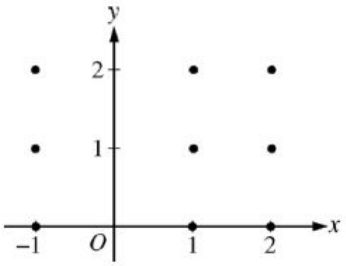
Differential Equations Test Review

Name your file First_Last_AssignmentName. Name

Calculator Active

1) For a – c consider the differential equation given by: $\frac{dy}{dx} = \frac{2xy}{3}$.

a) On the axes provided, sketch a slope field for the given differential equation at the points indicated.



b) Let $y = f(x)$ be a particular solution to the given differential equation with the initial condition $f(0) = 2$. Use Euler's method, with step size of 1, to approximate $f(2)$.

c) Find the particular solution $y = f(x)$ to the given differential equation with the initial condition $f(0) = 2$. Use your solution to find $f(2)$.

2. A population is modeled by a function P that satisfies the differential equation $\frac{dP}{dt} = -0.25P\left(1 - \frac{P}{20}\right)$

a) If $P(0) = 4$, then $\lim_{t\to\infty} P(t) =$ _____ **b)** If P(0) = 5, then $\lim_{t\to\infty} P(t) =$ _____

c) If $P(0) = 4$, for what value is P is the population growing the fastest? $P =$ _____

3. Write a differential equation to represent the rate of change of a population $P(t)$, if the rate at which the population is changing is proportional to $P - 4$. Then, solve the initial value problem given that $P(0) = 200$, and write P in terms of t and the constant of proportionality k.

4. A radioactive substance, such as Thorium-234, decays at a rate proportional to the amount of the substance present at any time t. It takes about 24 days for a sample of Thorium-234 to decay to the point where half of the original amount remains. How long, to the nearest day, will it take for a sample of 10g of Thorium-234 to decay to 1g?