1. R is the region between the $f(x) = e^x$ and $g(x) = x$ for $0 \le x \le 2$.

    Write a definite integral for the volume when R is rotated around

    (a) the y-axis: (b) around the line x=3
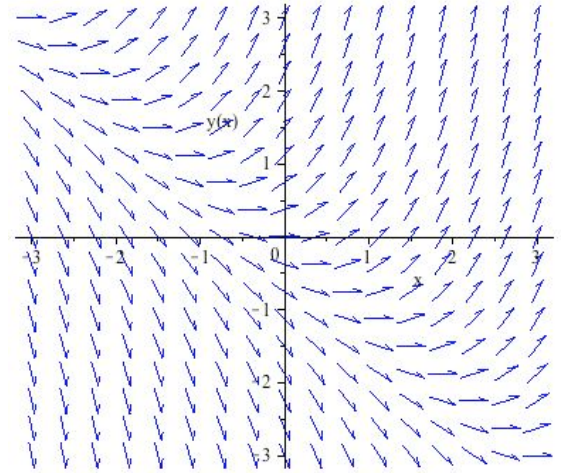
$$V = \int \qquad\qquad\qquad\qquad\qquad V = \int$$

(2)(2)

2. The figure shows the direction field for a differential equation.

    (a) Sketch the solution that goes through the point (-1 , 1).

    (b) Sketch the solution with the initial value condition y(0)= -1.

(2)(2)

3. Solve $\dfrac{dy}{dx} = 6x^2 + 4e^{2x} + \sin(x) \quad y(0) = 11$

    y = _____

(4)

4. Solve $\dfrac{dy}{dx} = \dfrac{x}{2y(1 + x^2)} \quad y(0) = 3 \qquad$ y = _____

(5)

5. The population at time t years is $P(t) = 200e^{0.4t}$ so $P(0) = 200$.

    How long will it take for the population to **triple**? _____

(2)

6. (a) Solve $\dfrac{dy}{dx} = 7y \quad and \quad y(0) = 3$.   (b) Solve $\dfrac{dy}{dx} = Ay \quad and \quad y(0) = B$

(1)(1)

          y = _____   y = _____