

**Calculus 2**  
**Intro/review**

Name: \_\_\_\_\_

1. Find the general solution to the following differential equations.

a.  $\frac{dy}{dx} = 8x + \frac{1}{x}$ .                      Solution:  $y =$

b.  $\frac{dy}{dt} = \sqrt{t} + \cos(2t)$                       Solution:  $y =$

2. Find the solution to the following initial value problems (IVPs).

(A solution to the differential equation that goes through the specified point)

a.  $\frac{dy}{dt} = \frac{1}{\sqrt{t}} + 2$ ,  $y(9) = -1$ .                      Solution:  $y =$

b.  $\frac{dr}{dt} = e^{3t} + \sin t$ ,  $r(0) = 1$ .                      Solution:  $r =$

3. A water balloon launched from the roof of a building at time  $t = 0$  has vertical velocity  $v(t) = -32t + 40$  ft./sec.
- a. Suppose the roof of the building is 30 feet above the ground. Set up an IVP for the height  $h(t)$  of the balloon at time  $t$ .

IVP:

- b. Solve the IVP to find a formula for the height of the balloon at time  $t$ .

Solution:  $h(t) =$

- c. What is the maximum height of the balloon.

Maximum height of \_\_\_\_\_ ft. after \_\_\_\_\_ seconds.