

**DoNow**

1. Equations

- (a) What is an equation?
- (b) What is a solution to an equation?
- (c) What type of object is a solution to an equations?

2. Differential Equations

- (a) What is a differential equation?
- (b) What is a solution to a differential equation?
- (c) What type of object is a solution to a differential equations?

3. A cup of black coffee is poured from a pot, whose contents are at 100 degrees (celsius), into a uninsulated cup in a room at 20 degrees. Let  $y(t)$  be a function that gives the temperature of the coffee as a function of time.

- (a) Sketch a graph of  $y(t)$ . Place appropriate ticks on the  $y$ -axis, but not on the  $t$ -axis.
- (b) Write a differential equation which might describe the cooling behavior. [Hint: At any given point  $(t_a, y_a)$  on the graph of  $y(t)$ , what can you say about  $y'(t_a)$ ?]

**New Questions**

4. Solve these differential equations with initial conditions:

(a)  $f'(x) = 4x + 7$  with  $f(3) = 19$ .

(b)  $\frac{y'}{2 \sin(t)} = \cos^3(t)$  with  $y(0) = 7$ .  
[ $y$  is a function of what variable?]

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