**1**. [12 points] You are moving straight upward in a hot air balloon.

- Your altitude $a = h(t)$, in miles, is a function of your time $t$, in hours, since takeoff.
- The air temperature $T = m(a)$ outside your balloon, in degrees Fahrenheit (°F), is a function of your altitude $a$, in miles.

Both $h$ and $m$ are differentiable and invertible. The following values are known.

- $h(0.5) = 0.33$
- $h'(0.5) = 2$
- $m(0.33) = 55$
- $m'(0.33) = -16$
- $h(1) = 0.5$
- $h'(1) = 0.33$
- $m(0.5) = 52.8$
- $m'(0.5) = -15$

**a**. [5 points] For each of the following two equations: fill in the missing value, then use a complete sentence to interpret the equation practically.

$m(h(0.5)) =$ _____

**Interpretation:**

$\int_{0.5}^{1} h'(t)\, dt =$ _____

**Interpretation:**

**b**. [3 points] Recall that $m(0.33) = 55$ and $m'(0.33) = -16$. Use these two values to estimate the temperature at an altitude of 0.43 miles. Include units and show your work.

**Answer (include units):** $\approx$ _____

**c**. [4 points] How fast is the air temperature outside your balloon decreasing 30 minutes after takeoff? That is, at what rate is the air temperature decreasing as a function of **time** at this instant? Include units, and show your work to justify your answer.

**Answer (include units):** _____