

Name _____

- You have 15 minutes
- No calculators
- Show sufficient work

1. (4 points) A man is standing on a bridge over a river. He reaches over the railing and throws a stone vertically upward. Until it lands in the river, the stone's height in feet above the river is $h = -16t^2 + 8t + 24$ where t is measured in seconds since the stone was thrown.

(a) What is the maximum height reached by the stone?

(b) What is the velocity of the stone as it strikes the river?

2. (3 points) There is a launch site of a hot-air balloon on the ground 90 meters away from an observer. The balloon rises vertically at a constant rate of 3 meters per second. How quickly is the angle of elevation of the balloon increasing 40 seconds after the launch?

3. (3 points) Suppose that A represents the number of grams of a radioactive substance at time t seconds. Given that $\frac{dA}{dt} = -0.25A$, how long does it take 12 grams of this substance to be reduced to 7 grams?