- 6. [9 points] As part of their training, once each week Littorina the snail attempts to travel as far as they can within one hour. Let q(x) be the probability density function (pdf) that describes the total distance x, in centimeters, that Littorina manages to travel within an hour.
  - **a**. [3 points] Which of the following expressions represent the statement "*The median distance that Littorina travels in their training runs is 300 centimeters.*"? Circle **all** options which apply.
    - i. q(300) = 0.5ii.  $\int_0^{\infty} q(x) \, dx = 0.5$ iii.  $\int_0^{\infty} q(x) \, dx = 0.5$ iii.  $\int_0^{300} q(x) \, dx = 0.5$ iv.  $\int_0^{\infty} q(x) \, dx = 300$ vii.  $\int_0^{300} q(x) \, dx = \int_{300}^{\infty} q(x) \, dx$ viii. NONE OF THESE
  - b. [3 points] Circle the one statement below that is best supported by the equation

$$q(150) = 0.002$$

- i. The probability that Littorina travels exactly 150 centimeters is 0.002.
- ii. Littorina travels 150 centimeters or fewer in approximately 0.2% of their training runs.
- iii. Littorina travels between 150 and 151 centimeters in about 0.002% of their training runs.
- iv. Every 150 seconds, Littorina travels roughly an extra 0.2 centimeters.
- v. In their training runs, Littorina travels between 140 and 160 centimeters about 4% of the time.
- vi. None of the above.
- c. [3 points] Let Q(x) be the cumulative distribution function (cdf) which corresponds to q(x). Suppose that 10% of the time, Littorina travels less than 90 centimeters. Additionally, suppose that 27% of the time, Littorina travels more than 500 centimeters. What is the value of Q(500) - Q(90)? Circle **one** option below.

v. 0.17	i. 17
vi. 0.37	ii. 37
vii. 0.63	iii. 63
viii. 0.83	iv. 83