9. [9 points] For this entire problem assume:

- $f(x)$ is a decreasing function.
- $h(x)$ is a quadratic function.
- $r(x)$ is an exponential function with growth factor $\frac{1}{3}$, satisfying $r(0) > 0$.
- All of the above functions have domain $(-\infty, \infty)$.

a. [4 points] Which of the following COULD be true? Circle all that apply. Unclear answers will be marked incorrect.

  (i) The function $f(x)$ is concave up.

  (ii) The function $f(x)$ is exponential.

  (iii) The function $f(x)$ is quadratic.

  (iv) The function $f(x)$ has no x-intercepts.

  (v) The average rate of change of $f(x)$ between $x = 1$ and $x = 5$ is 1.

b. [3 points] Which of the following MUST be true? Circle all that apply. Unclear answers will be marked incorrect.

  (i) The function $h(x)$ has at least one x-intercept.

  (ii) The average rate of change of $h(x)$ between $x = 1$ and $x = 2$ is less than the average rate of change of $h(x)$ between $x = 2$ and $x = 3$.

  (iii) The average rate of change of $r(x)$ between $x = 1$ and $x = 2$ is less than the average rate of change of $r(x)$ between $x = 2$ and $x = 3$.

  (iv) $r(-2)$ is positive.

c. [2 points] Compute $\dfrac{r(100)}{r(98)}$ in **exact** form.

$$\frac{r(100)}{r(98)} = \underline{\quad 1/9 \quad}$$