

Work out the following problems neatly in the space below. If the space is too cramped for you, you may use your own paper and staple it to this one. This is due Tuesday 12/15/09 when you take the final. The points you earn are based on the number of correct answers.

1. Write the function in vertex (a-h-k) form by completing the square. (2 points)

$$y = -0.2x^2 + 0.14x + 18$$

2. The following equation describes the distance from the ground,  $h$ , measured in feet, as a function of time,  $t$ , measured in seconds, for a ball thrown up in the air.  $h(t) = -16t^2 + 96t + 5$

- a) Determine the vertex and interpret the meaning of each of its coordinates. (1 points)

- b) When will the ball hit the ground? (1 points)

3. The magnitude of a star is given by the following formula.  $M = -1.5 \log\left(\frac{B}{B_0}\right)$ , where  $B$  is the brightness of the star.

a) What is the magnitude of a star with brightness 3 times  $B_0$ ? (1 point)

b) A particular star has magnitude 4.5. What is the brightness of the star in terms of  $B_0$ ? (1 point)

4. A particular population is described by the following model:  $P(t) = 1.2 \times 10^5 (0.95)^t$ , where  $t$  is measured in years.

a) Give the growth/decay factor and the growth/decay rate. (2 points)

b) Rewrite the model using base  $e$ . What is the instantaneous growth or decay rate? (2 points)