Math U141 F08 Quiz #1A Prof. A. Iarrobino Name_____

*Please include all work for full credit.*

1. Consider the secant line cutting $y=3x^2-2x-3$ at the points P(2,5) and Q(2+h,$3(2+h)^2-2(2+h)-3$). Here y= height in feet, x = time in minutes.

A. Find the slope $m_{PQ}$ of the line PQ (the answer is in terms of h).

B. Find the slope of the graph of $y=3x^2-2x-3$ at x=2, by finding $\lim_{h\to 0} m_{PQ}$.

C. Find the equation of the tangent line to the graph at x=2, using #1B.

2A. Consider the height function of the Centennial Balloon flown by the Northeastern University Aerial Balloon Society. By examining slopes, determine if the function is linear. If not, explain why not.

| | P | Q | R | S |
|---|---|---|---|---|
| time | 9 AM | 9:30 | 10:40 | 11 |
| height (ft) | 32 | 47 | 82 | 90 |

2B. Give equations of the line PQR letting x= time in minutes since 9 AM, y=height of balloon in feet.

2C Write an equation for the line segment RS using units of yards (one yard = 3 feet) for height and hours for time, with x=0 taken as 9 AM.

2D. Give coordinates for the point 2/3 along the line PQ.

3A*. If a biker averages 20 mph over a 30 mile bike ride, which of the following are always true. Explain why or why not.

a. The biker takes 1.5 hours for the ride. **Ans** _____

b. The biker must be going at 20 mph sometime during the ride. **Ans.** _____

c. Assume the same biker averages s mph for the first 10 miles; then determine the average speed for the last 20 miles of the trip.

*OR*

3B*. Approximate the derivative of $4^x$ at x=0. Set up the difference quotient, giving the slope $m_{PQ}$ from the point P(0,1) to Q(h, $4^h$), then use a small value of h to approximate the slope $m_P$. (Give the value of h used).