

Math 151

Winter 2006

TA: Oguz Kurt

QUIZ # 3

(Form D)

Name:

1)[10 Points] Consider the equation

$$\sin\left(\frac{\pi}{14}x\right) + \frac{42}{x} = 6 \quad (\star)$$

(a) Use the Intermediate Value Theorem (IVT) to show that (\star) has a solution on the interval $[7, 14]$. When you invoke the IVT make sure that you address and verify the following:

- (i) Necessary general properties of relevant function.
- (ii) Relevant values at end points.
- (iii) All necessary inequalities.

Justify all Steps!

(b) Does (\star) also have a solution on $[-1, 1]$?
Can the IVT be applied to this situation?

Give Clear and Full Explanations!

2) [10 Points] The distance traveled by a train is given, as a function of time, by

$$s(t) = \sqrt{5t + 3}.$$

Show all Work!

Do not simplify numerical expressions!

- (a) What is the *average velocity* of the train on the time interval $[3, 5]$.
- (b) Find an expression in h for the average velocity of the train over the time interval $[3, 3 + h]$.
- (c) Use (b) to find the instantaneous velocity of the train at time $t = 3$.

Give exact numerical expressions - no decimal numbers!

(d) Find the equation of the tangent line to the graph of $s(t)$ at time $t = 3$.¹

¹This describes the uniform motion of an object which released from the train at time $t = 3$ assuming that not other forces (such as air friction) are acting on it.