

Quiz 5
Math 31–6429

You should fully justify your answers. Do all your work on separate paper, and make sure to *print* your name in the first sheet and staple all the sheets together. **Unstapled, loose pieces of paper will not be graded.** This quiz is due on Thursday, October 18, at 6:00 pm.

1. A particle moves in a straight line according to the law of motion

$$s(t) = \frac{t}{4 + t^2}, \quad t \geq 0$$

where time is measured in seconds and the position is measured in feet. Answer the following questions:

- (a) Find the velocity of the particle at time t .
 - (b) Find the acceleration at time t .
 - (c) Where on the line is the particle after 4 seconds?
 - (d) Find the total distance traveled during the first 4 seconds.
2. Suppose that two motorboats leave from the same point at the same time. If one travels north at 15 miles per hour and the other travels east at 20 miles per hour,
- (a) how far apart will they be after 2 hours?
 - (b) how fast will the distance between them change after 2 hours?
3. Find all critical points of the following functions:
- (a) $f(x) = 3x^2 - 5x + 6$
 - (b) $g(x) = 2x^3 + 3x^2 - 12x + 5$
 - (c) $f(t) = |5x - 3|$
 - (d) $h(t) = \cos 2t$
 - (e) $f(x) = \frac{x + 1}{x^2 + x + 1}$