

**King Fahd University of Petroleum and Minerals**  
**Department of Mathematics & Statistics**  
**Math101.03**  
**Semester 092**  
**Quiz (3)**

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**Name:**

**ID #:**

**Serial #:**

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1. [2 points] Find all horizontal and vertical asymptotes, if any exists, of:

$$f(x) = \frac{\sqrt{9x^2 + 1}}{5 - 2x}$$

2. [2 points] Evaluate the following limit:

$$\lim_{x \rightarrow \infty} (\sqrt{x^2 + x} - x)$$

3. The position function of a particle moving in a straight line is given by

$$s(t) = t^3 - 2t$$

where  $t$  is measured in seconds and  $s$  in meters.

(a) **[1 point]** Find the average velocity of the particle over the time interval  $[1,3]$ .

(b) **[1 point]** Use limits to find the instantaneous velocity of the particle when  $t = 2$ .

4. **[2 points]** Using the definition of the derivative, find an equation of the tangent line to the curve

$$y = \frac{1}{x-2}$$

at the point where  $x = 4$ .

5. **[Bonus]** Determine the point  $P(a,b)$  on the graph of  $f(x) = \sqrt{2x+1}$  which has the property that the tangent line at  $P$  is parallel to the line  $y = \frac{1}{3}x - 1$ .

Good luck  
Khaled Al-Anezy