

Quiz 3

Name: _____

Instructions: Complete the following problems. You may use any result from class you like, but if you cite a theorem be sure to verify the hypotheses are satisfied.

1. (2 pts) Evaluate $\lim_{t \rightarrow 0} \frac{\sqrt{a^2 - t} - a}{t}$

2. (2 pts) Evaluate $\lim_{t \rightarrow -2} \frac{t^2 + t - 2}{2t^2 + 7t + 6}$

3. (3pts) Does the function $f(x) = 2^{-x} - x$ have any solutions? Be sure to justify your claim.

4. (3pts) Determine if the following statements are true or false for arbitrary functions $f(x)$ and $g(x)$. **If true, cite the theorem which justifies the statement. If false, provide a counterexample.**

- If $\lim_{x \rightarrow a} f(x)$ does not exist, then $\lim_{x \rightarrow a} [f(x) + g(x)]$ does not exist.

- If $\lim_{x \rightarrow a} g(x) = 0$, then $\lim_{x \rightarrow a} \left[\frac{f(x)}{g(x)} \right]$ diverges.

- If $\lim_{x \rightarrow a} f(x)$ and $\lim_{x \rightarrow a} g(x)$ exist, then $\lim_{x \rightarrow a} [f(x) \cdot g(x)]$ exists.

Bonus. (1/2 point) Let $f(x) = x^{-2}$. Compute $\lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$.