

Mr. Bradshaw  
Math 101A Ch. 1 Sample Test

1. Estimate the length of the curve  $y = \sqrt{3x + 2}$  on the interval  $2 \leq x \leq 4$  by using 3 intervals.
2. Sketch the graph of a function with the condition that  $f(2) = 5$ ,  $\lim_{x \rightarrow 2^-} f(x) = 4$  and  $\lim_{x \rightarrow 2^+} f(x) = 2$ .
3. Sketch the graph of a function with the condition that  $f(0) = 5$  and  $\lim_{x \rightarrow 3} f(x) = -\infty$ .
4. Use algebra to determine the following limits.

(a)  $\lim_{x \rightarrow 9} \frac{x - 9}{\sqrt{x} - 3}$

(b)  $\lim_{x \rightarrow 4} \left( \frac{1}{x - 4} - \frac{3}{x^2 - 16} \right)$

(c)  $\lim_{x \rightarrow \infty} \left( \frac{\ln(2 + e^{3x})}{\ln(2 + e^{4x})} \right)$

5. Determine the values of  $a$  and  $b$  so that  $f(x)$  is continuous if

$$f(x) = \begin{cases} x + 1 & \text{if } x > 3 \\ a - bx & \text{if } 1 \leq x \leq 3 \\ x^2 & \text{if } x < 1 \end{cases}$$

6. Use the method of bisections for four steps to approximate the solution of  $x^5 - 7x + 1 = 0$  on the interval  $0 \leq x \leq 1$ .
7. For  $f(x) = 2x - \frac{400}{x}$ , we have  $f(-1) > 0$  and  $f(2) < 6$ . Does the intermediate value theorem guarantee a zero of  $f(x)$  between  $x = -1$  and  $x = 2$ ? Explain.
8. Find the slant asymptote to the function  $y = \frac{2x^2 - 5x + 1}{3x - 1}$ .

9. Use algebra to find  $\delta$  in terms of  $\epsilon$  given  $\lim_{x \rightarrow 3} (5 - 3x) = -4$ .