

All questions worth 10 points. No work = No credit.

1. Specify the domain of the function  $f(x) = \frac{x^2 - x - 2}{x - 2}$ , and sketch it (be sure to label your axes)
2. Specify the domain of the function  $f(x) = \frac{1}{x^2 + 1} + \sqrt{x + 3}$
3. For the function  $f(x) = 3x^2 + 2x$ ,  $g(x) = \sqrt{x + 1}$ , find  $f \circ g(x)$  and  $g \circ f(x)$  and their domains
4. When is the function  $\frac{\sin(x)}{\cos\left(\frac{x}{2}\right)}$  equal to zero? When is it undefined?
5. Find  $\lim_{x \rightarrow 5} \frac{x^2 - 2x - 15}{x - 5}$
6. Find  $\lim_{x \rightarrow 0} \frac{\sqrt{x + 16} - 4}{x}$
7. Find  $\lim_{x \rightarrow 2} \frac{x^2 + 4x - 12}{|x - 2|}$  by evaluating the limit from the right and left
8. Find  $\lim_{x \rightarrow \infty} \frac{x^2 + 2x^3 + 7x}{3x + x^3 + 17x^2}$  and  $\lim_{x \rightarrow -\infty} \frac{x^2 + 2x^3 + 7x}{3x + x^3 + 17x^2}$
9. Find all asymptotes (horizontal and vertical) for  $f(x) = \frac{(x - 3)(4 + 2x)(x + 7)}{(x + 7)(6 - 3x)(x + 12)}$
10. Sketch a function that has the following (and label)...
  - a) a removable discontinuity
  - b) an infinite discontinuity
  - c) a jump discontinuity
  - d) a horizontal asymptote
  - e) a vertical asymptote
  - f) at least one horizontal tangent