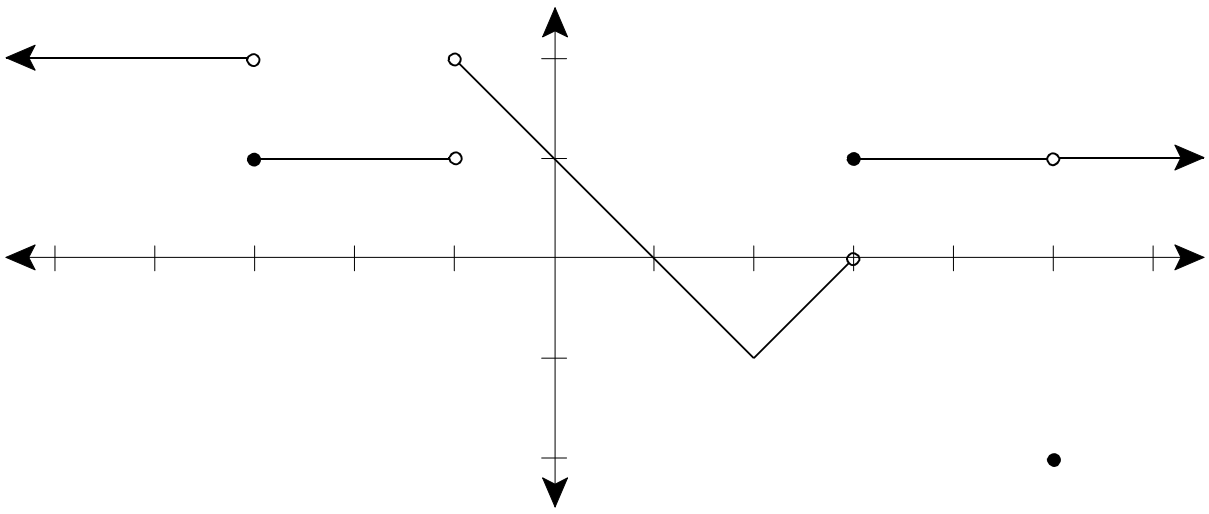
Exam 1a Calc 1 9/25/2015

Each problem is worth 10 points. For full credit provide complete justification for your answers.

Use the graph of $g(x)$ at the bottom of the page for problems 1 and 2:

1. Find the following limits:
   a) $\lim_{x\to 3^-} g(x)$
   b) $\lim_{x\to 3^+} g(x)$
   c) $\lim_{x\to 3} g(x)$
   d) $\lim_{x\to 5^+} g(x)$
   e) $\lim_{x\to 5} g(x)$

2. For which values of x does the function fail to be continuous?



3. Fill in the table of values and guess the value of the limit $\lim_{y \to 2} \frac{y^2 - y - 2}{y^2 + y - 6}$.

y	$f(y)$	y	$f(y)$
2.002		1.998	
2.001		1.999	
2.0001		1.9999	

4. Evaluate $\lim_{t \to 2.5} \frac{-16t^2 + 100}{t - 2.5}$.

5. Evaluate $\lim_{x\to 2}\sqrt{\frac{4+2x^3}{3x-1}}$, **carefully identifying which limit law you use at each step.**

6. Evaluate $\lim_{\theta\to 0}\frac{1-\cos\theta}{\theta}$ by any means you prefer. **Provide good justification for your conclusion.**

7. Bunny is a calculus student at Enormous State University, and she's having some trouble. Bunny says "Ohmygod. I always thought math was okay because I could learn to get the answers to problems, but now it's all different! There's, like, these, like, questions where we're supposed to *classify* stuff instead of work out an answer. Ohmygod, is this biology or something? So, like, we're supposed to be able to tell when a discontinuity is removable or a jumpy one or infinite, and I have no clue how you do that. Ohmygod!"

   Help Bunny by explaining as clearly as you can what the difference is between these three kinds of discontinuities.

8. Find all horizontal and vertical asymptotes of $f(x)=\dfrac{\sqrt{36x^2+7}}{11x+4}$.

9. Find the value for the constant c that makes the function $f(x) = \begin{cases} x^2 - c & \text{for } x < 5 \\ 3x + 2c & \text{for } x \geq 5 \end{cases}$ continuous.

10. Evaluate $\lim_{h \to 0} \dfrac{\dfrac{1}{(h+a)^2} - \dfrac{1}{a^2}}{h}$.

Extra Credit (5 points possible):

What can you say about $\lim_{\theta \to \pi/2} \dfrac{\cot\theta}{\csc\theta}$?