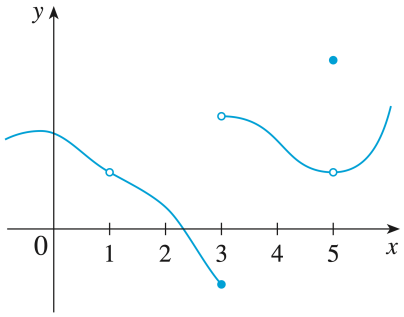
ACMAT161 Summer 2024
Professor Manguba-Glover
Classwork 7 & 8 Name: _____

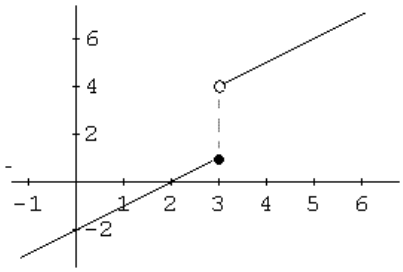
Complete as many of the following problems as you can with your table in the allotted time. You do not have to go in order.

Classwork 7

1. Where is the following function discontinuous? Explain which requirement it fails:



(a)



(b)

2. Where is the function discontinuous? Explain why. $f(x) = \begin{cases} \frac{1}{x^2} & \text{if } x \neq 0 \\ 1 & \text{if } x = 0 \end{cases}$

3. Is the $f(x)$ continuous at $x = 3$? At $x = -3$? Where $f(x) = \begin{cases} \dfrac{x^3 - 27}{x^2 - 9} & x \neq 3 \\ \dfrac{9}{2} & x = 3 \end{cases}$

4. Determine the interval(s) where $f(x)$ is continuous if $f(x) = \begin{cases} 0 & x < 0 \\ x^2 - 5x & 0 \leq x \leq 5 \\ 5 & x > 5 \end{cases}$

5. For what value of c is $f(x) = \begin{cases} \dfrac{x^3 - 1}{x - 1} & x < 1 \\ cx - 2 & x \geq 1 \end{cases}$ continuous?

6. Find $\lim\limits_{x \to \infty} e^{\frac{2x^2+7x-3}{x^2-5x+1}}$

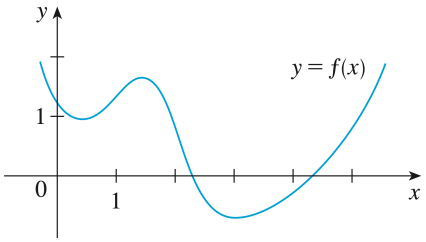
7. Explain why the equation $\cos x = x$ has at least one solution. (Hint: get everything to one side first)

Key:

1. (a) $x = 1$, $x = 3$, $x = 5$
   (b) $(-\infty, 3], (3, \infty)$
2. $x = 0$
3. Yes at $x = 3$, no at $x = -3$
4. $(-\infty, 5]$, $(5, \infty)$
5. 5
6. e^2
7. Use IVT

Classwork 8

1. Find an equation of the line tangent to the graph of $f(x) = \frac{3}{x}$ at $\left(2, \frac{3}{2}\right)$
2. Find an equation of the line tangent to the graph of $f(x) = x^3 + 4x$ at $(1, 5)$
3. Let $f(x) = \sqrt{2x} + 1$ and compute $f'(2)$
4. Find the derivative of $f(x) = -x^2 + 6x$
5. Find the derivative of $g(t) = \frac{1}{t^2}$
6. Find f' for $f(x) = \frac{1-x}{2+x}$
7. Sketch the derivative of $f(x)$:



Key:

1. $y - \frac{3}{2} = -\frac{3}{4}(x-2)$ or $y = -\frac{3}{4}x + 3$
2. $y - 5 = 7(x-1)$ or $y = 7x - 2$
3. $\frac{1}{2}$
4. $-2x + 6$
5. $-\frac{2}{t^3}$
6. $-\frac{3}{(2+x)^2}$
7.