

Name _____ Rec. Instr. _____
 Signature _____ Rec. Time _____

Math 220
 Exam 1
 September 20, 2018

No books, calculators, or notes are allowed. Please make sure that your cell phone is turned off. You will have 75 minutes to complete the exam.

SHOW YOUR WORK!

Problem	Points	Points Possible	Problem	Points	Points Possible
1		15	7		4
2		5	8		4
3		16	9		7
4		4	10		5
5		7	11		25
6		8	Total Score		100

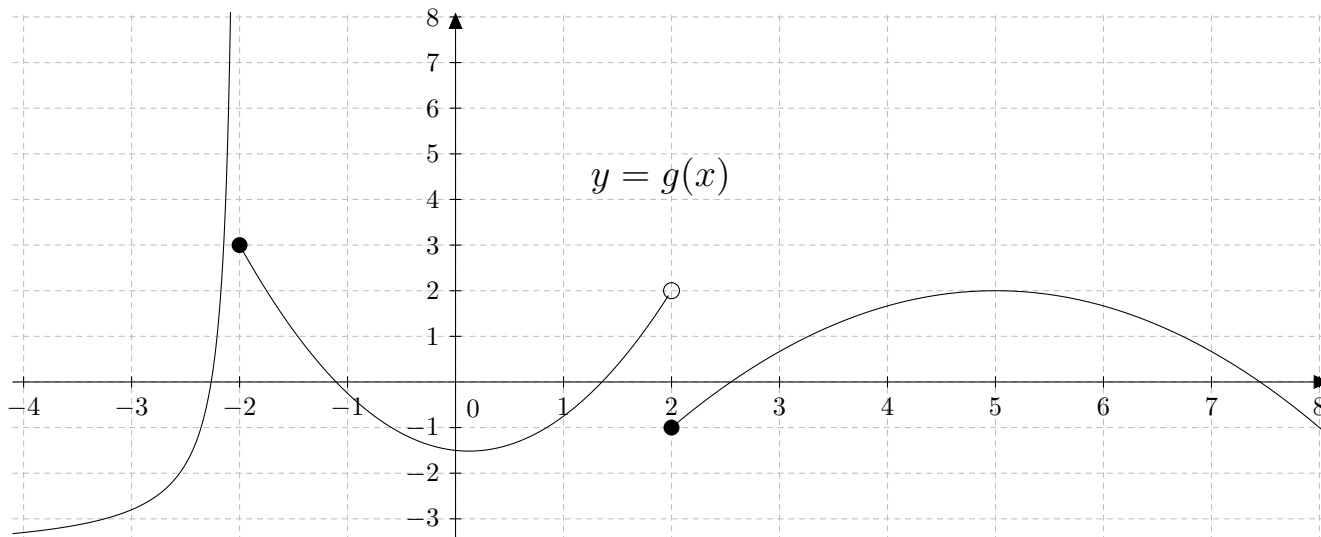
1. (5 points each) Evaluate the following limits.

A. $\lim_{\theta \rightarrow 0} \frac{\cos(\theta)}{\theta - 3}$

B. $\lim_{x \rightarrow 3} \frac{x^2 - 5x + 6}{x - 3}$

C. $\lim_{x \rightarrow 1} \left(\frac{1}{x - 1} - \frac{1}{x^2 - x} \right)$

2. (5 points) Evaluate $\lim_{\theta \rightarrow 0} \theta^2 \sin \left(\frac{1}{\theta} \right)$. **(Justify your reasoning, and state the name of any theorem applied.)**



3. (2 points each) Consider the graph of $y = g(x)$ above. State the value of each of the below quantities. If the quantity does not exist, write “does not exist”.

A. $\lim_{x \rightarrow -2^-} g(x)$

E. $\lim_{x \rightarrow 2^-} g(x)$

B. $\lim_{x \rightarrow -2^+} g(x)$

F. $\lim_{x \rightarrow 2^+} g(x)$

C. $\lim_{x \rightarrow -2} g(x)$

G. $\lim_{x \rightarrow 2} g(x)$

D. $g(-2)$

H. $g(2)$

4. (4 points) Consider the graph of $y = g(x)$ above. List the x -coordinates where the function is discontinuous.

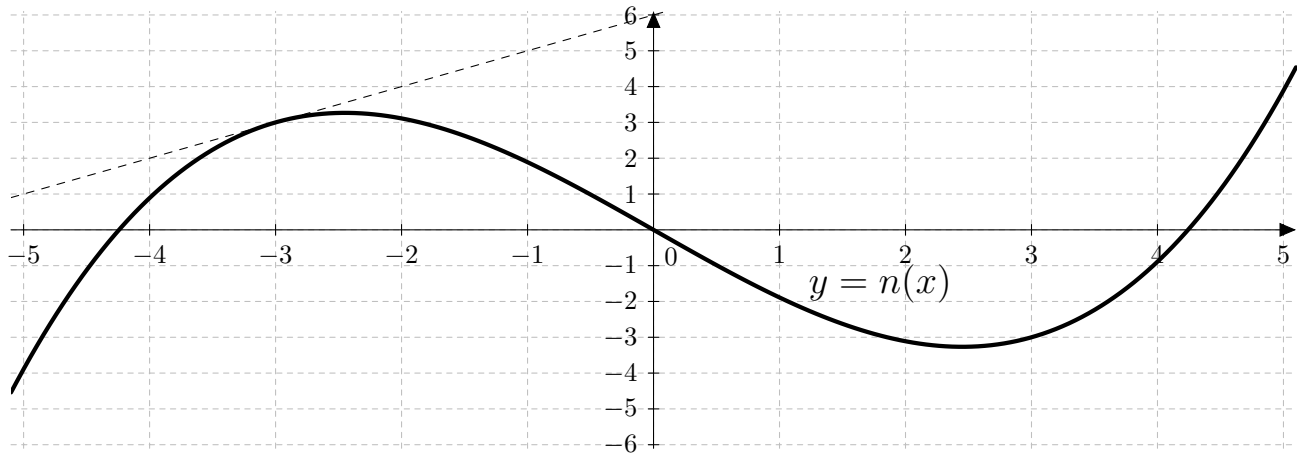
5. (7 points) Let $f(x) = \sqrt{x}$. Using the limit definition of the derivative, find $f'(4)$.

6. (4 points each) Given that $\lim_{x \rightarrow -2} u(x) = 5$ and $\lim_{x \rightarrow -2} w(x) = 11$, find the following limits.

A. $\lim_{x \rightarrow -2} \frac{w(x) + 4}{u(x)}$

B. $\lim_{x \rightarrow -2} \sqrt{u(x) + w(x)}$

7. (4 points) Suppose that a waiter brings you a cold beverage on a hot day. Let $T(t)$ denote the temperature in degrees Fahrenheit of the beverage after t minutes. Is $T'(2)$ positive or negative? (Explain your answer.)



8. (2 points each) The function $y = n(x)$ is graphed above in solid bold. There is also a dotted line graphed. Find the following two values.

A. $n(-3) =$

B. $n'(-3) =$

9. The height in feet of a ball t seconds after being thrown directly upward is given by $y(t) = -16t^2 + 20t + 5$.

- A. (5 points) Find the velocity 1 second after the ball is thrown (**include the units**).

- B. (2 points) Is the ball going upward or downward 1 second after being thrown?

10. (5 points) Given that $h(2) = 5$ and $h'(2) = 3$, find the equation of the tangent line to the graph of $y = h(x)$ at $x = 2$.

11. (5 points each) Find the following derivatives. You **do not need to simplify** your answers or show your work. However, showing your work may help you earn partial credit if your answer is incorrect.

A. $\frac{d}{dx} (3x^8 - \pi^2)$

B. $\frac{d}{dx} \left(\frac{5}{x^3} + \sqrt{x} \right)$

C. $\frac{d}{d\theta} (\sin(\theta) \cdot \cos(\theta))$

D. $\frac{d}{d\theta} \tan(2\theta^7)$

E. $\frac{d}{dx} \left(\frac{x^5 + 4}{3x^2 + 9} \right)$