

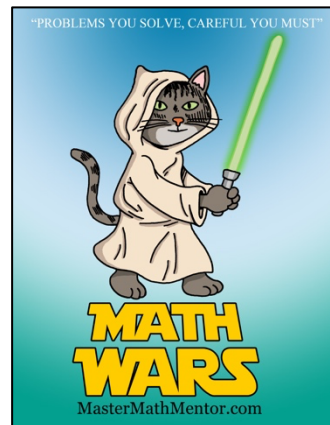
Math Wars – AB Calculus

Scrambled 160 – Limits & Derivatives



Maximum Time: 7.5 Minutes

Directions: To start, you need to download the Math Wars application on your cell phone: Use the QR code or the url: <https://mastermathmentor.com/mmm/mathwars.ashx?key=160>



When ready, start the timer and then solve the problems below, entering your choice, A, B, C, D and pressing **Submit** for each problem when you are sure of your answer. When complete, stop the timer. You will see problems you got correct in green and incorrect in red. You will receive a score based on how many problems you got right and your time. A perfect score is all problems correct using half the maximum time or less. You can text or email your friends with your results.

1. (1 pt) For which of the following limits is using l'Hospital's rule not appropriate?

A. $\lim_{x \rightarrow 2} \left(\frac{2x-4}{3x-6} \right)$

B. $\lim_{x \rightarrow 0} \left(\frac{x - \sin x}{\tan x - e^x + 1} \right)$

C. $\lim_{x \rightarrow 0} \left(\frac{x}{\ln x} \right)$

D. $\lim_{x \rightarrow \infty} (xe^{-x})$

2. (3 pts) A particle is moving along the x -axis with position $x(t) = t + \frac{16}{t+1} + 4$ for 4 seconds. How many seconds is the particle moving left?

A. 0 seconds

B. 1 second

C. 2 seconds

D. 3 seconds

3. (5 pts) If $f(x) = x^5 + 2x^3 + 8x - 1$, find $[f^{-1}]'(-1)$

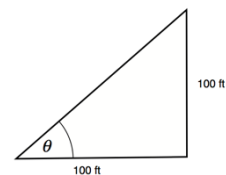
A. $\frac{-1}{19}$

B. $\frac{1}{19}$

C. -19

D. $\frac{1}{8}$

4. (7 pts) An apartment building whose height changes by 2 feet per day is being constructed. A laser surveying tool is fixed 100 feet from the base of the building as shown in the figure and it keeps the current top of the building always in focus. When the building is 100 feet high, approximately how fast does the angle of elevation of the surveying tool change?



A. $0.005^\circ/\text{day}$

B. $0.01^\circ/\text{day}$

C. $0.02^\circ/\text{day}$

D. $0.6^\circ/\text{day}$

5. (9 pts) Let $f(x) = \begin{cases} 6e^{x-3} + c, & x \geq 3 \\ a(6-x)^2 + b, & x < 3 \end{cases}$. Suppose f is differentiable. Which statement must be true?

A. A sufficient condition is that $b - c = 15$

B. A necessary condition is that $b - c = 15$

C. It is possible that $b - c = 15$.

D. Even with knowing the value of a , no statement is possible about b and c .