

AP Calculus I
Derivatives as Limits Practice

Name _____

Date _____

Evaluate each limit as a derivative. Do not use a calculator.

1. $\lim_{n \rightarrow 0} \frac{(-\frac{2}{5} + n)^2 - \frac{4}{25}}{n}$ is

- a) $-\frac{4}{5}$ b) $\frac{5}{2}$ c) $\frac{2}{5}$ d) $\frac{4}{5}$
e) no limit

2. What is $\lim_{h \rightarrow 0} \frac{\sqrt[3]{27+h} - \sqrt[3]{27}}{h}$?

- a) $\frac{1}{27}$ b) $\frac{1}{9}$ c) $\frac{1}{81}$ d) $\frac{1}{3}$ e) 0

3. $\lim_{x \rightarrow 64} \frac{x^{\frac{1}{3}} - 4}{x - 64} =$

- a) $\frac{1}{4}$ b) $\frac{1}{16}$ c) $\frac{1}{48}$ d) $\frac{1}{8}$ e) 16

4. $\lim_{x \rightarrow 1} \frac{\ln x}{x - 1}$ is

- a) 1 b) ∞ c) -1 d) $\ln 2$ e) e

5. $\lim_{n \rightarrow 0} \frac{10^n - 1}{n}$ is

- a) 1 b) 0 c) $\ln 10$ d) $\log 1$ e) e

6. $\lim_{h \rightarrow 0} \frac{e^{2(x+h)} - e^{2x}}{h}$ is

- a) 1 b) 0 c) $2e$ d) $2e^x$ e) e^2

7. $\lim_{x \rightarrow 4} \frac{\sqrt{x} - 2}{x - 4} =$

- a) 0 b) $-\frac{1}{4}$ c) $\frac{1}{4}$
d) $\frac{1}{2}$ e) undefined

8. What is $\lim_{h \rightarrow 0} \frac{(4+h)^3 - 4^3}{h}$?

- a) $8h$ b) 16 c) 48 d) 64 e) 8

9. What is $\lim_{h \rightarrow 0} \frac{\sqrt{9+h} - \sqrt{9}}{h}$?

- a) $\frac{1}{18}$ b) $\frac{1}{6}$ c) 6
d) 18 e) $\frac{1}{2\sqrt{9+h}}$

10. What is $\lim_{h \rightarrow 0} \frac{\sin(\frac{\pi}{3} + h) - \sin(\frac{\pi}{3})}{h}$?

- a) 0 b) $-\frac{1}{2}$ c) $\frac{1}{2}$
d) $\frac{\sqrt{3}}{2}$ e) $-\frac{\sqrt{3}}{2}$

11. What is $\lim_{h \rightarrow 0} \frac{\cos(\frac{\pi}{6} + h) - \cos(\frac{\pi}{6})}{h}$?

- a) 0 b) $-\frac{1}{2}$ c) $\frac{1}{2}$
d) $\frac{\sqrt{3}}{2}$ e) $-\frac{\sqrt{3}}{2}$

12. $\lim_{x \rightarrow 3} \frac{\frac{1}{x} - \frac{1}{3}}{x - 3} =$

- a) 0 b) $-\frac{1}{9}$ c) $\frac{1}{27}$ d) $\frac{1}{9}$ e) $\frac{1}{3}$