

Calculus Practice: Derivatives 1a

Evaluate each limit.

1)
$$\lim_{h \rightarrow 0} \frac{\left(-\frac{2}{3} + h\right)^2 - \left(-\frac{2}{3}\right)^2}{h}$$

A) $-\frac{4}{3}$ B) $\frac{11}{3}$

C) $\frac{8}{5}$ D) 2

2)
$$\lim_{h \rightarrow 0} \frac{\left(-\frac{2}{3} + h\right)^3 - \left(-\frac{2}{3}\right)^3}{h}$$

A) $\frac{3}{13}$ B) $\frac{5}{7}$

C) $\frac{4}{3}$ D) $\frac{3}{5}$

3)
$$\lim_{h \rightarrow 0} \frac{\left(\frac{1}{3} + h\right)^2 - \frac{1}{9}}{h}$$

A) $\frac{7}{2}$ B) $\frac{1}{6}$

C) $\frac{11}{4}$ D) $\frac{2}{3}$

4)
$$\lim_{h \rightarrow 0} \frac{\left(-\frac{3}{2} + h\right)^3 + \frac{27}{8}}{h}$$

A) $\frac{23}{14}$ B) $\frac{19}{10}$

C) $\frac{31}{11}$ D) $\frac{27}{4}$

5)
$$\lim_{h \rightarrow 0} \frac{\left(-\frac{2}{3} + h\right)^4 - \left(-\frac{2}{3}\right)^4}{h}$$

A) $\frac{19}{14}$ B) $\frac{31}{19}$

C) $-\frac{32}{27}$ D) $\frac{37}{18}$

6)
$$\lim_{h \rightarrow 0} \frac{\left(\frac{1}{3} + h\right)^5 - \left(\frac{1}{3}\right)^5}{h}$$

A) $\frac{14}{71}$ B) $\frac{14}{83}$

C) $\frac{5}{81}$ D) $\frac{1}{30}$

7)
$$\lim_{h \rightarrow 0} \frac{\left(-\frac{1}{3} + h\right)^4 - \frac{1}{81}}{h}$$

A) $\frac{4}{35}$ B) $\frac{1}{27}$

C) $-\frac{4}{27}$ D) $\frac{5}{16}$

8)
$$\lim_{h \rightarrow 0} \frac{\left(-\frac{2}{3} + h\right)^5 + \frac{32}{243}}{h}$$

A) $\frac{77}{85}$ B) $\frac{11}{10}$

C) $\frac{80}{81}$ D) $\frac{86}{75}$

$$9) \lim_{h \rightarrow 0} \frac{\sqrt{4+h} - \sqrt{4}}{h}$$

- A) $\frac{1}{4}$ B) $\frac{7}{8}$
 C) $\frac{1}{3}$ D) 2

$$10) \lim_{h \rightarrow 0} \frac{\sqrt{5+h} - \sqrt{5}}{h}$$

- A) $\frac{\sqrt{5}}{10}$ B) $\frac{\sqrt{6}}{4}$
 C) $\frac{\sqrt{10}}{2}$ D) $\frac{\sqrt{6}}{18}$

$$11) \lim_{h \rightarrow 0} \frac{\sqrt{3+h} - \sqrt{3}}{h}$$

- A) $\frac{2\sqrt{3}}{7}$ B) $\frac{\sqrt{3}}{6}$
 C) $\frac{2}{3}$ D) $\frac{\sqrt{3}}{12}$

$$12) \lim_{h \rightarrow 0} \frac{\sqrt{4+h} - 2}{h}$$

- A) $\frac{1}{4}$ B) $\frac{2}{3}$
 C) 0 D) $\frac{4}{9}$

$$13) \lim_{h \rightarrow 0} \frac{\cos\left(\frac{\pi}{4} + h\right) - \cos \frac{\pi}{4}}{h}$$

- A) $\frac{\sqrt{5}}{2}$ B) $\frac{\sqrt{11}}{6}$
 C) $-\frac{\sqrt{2}}{2}$ D) 0

$$14) \lim_{h \rightarrow 0} \frac{\tan\left(\frac{\pi}{4} + h\right) - \tan \frac{\pi}{4}}{h}$$

- A) 1 B) 0
 C) 2 D) 3

$$15) \lim_{h \rightarrow 0} \frac{\sin\left(\frac{\pi}{6} + h\right) - \frac{1}{2}}{h}$$

- A) $\frac{\sqrt{3}}{2}$ B) $\frac{\sqrt{13}}{3}$
 C) 0 D) $\frac{2\sqrt{2}}{3}$

$$16) \lim_{h \rightarrow 0} \frac{\tan\left(\frac{2\pi}{3} + h\right) + \sqrt{3}}{h}$$

- A) 4 B) 3
 C) 1 D) 2

$$17) \lim_{h \rightarrow 0} \frac{\ln(9+h) - \ln 9}{h}$$

- A) 1 B) $\frac{3}{5}$
 C) $\frac{1}{9}$ D) $\frac{1}{3}$

$$18) \lim_{h \rightarrow 0} \frac{\ln(10+h) - \ln 10}{h}$$

- A) $\frac{8}{15}$ B) $\frac{3}{2}$
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