Clicker Questions

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Review of Limits

If a function $y = f(x)$ is not defined at $x = a$, then

a) $\lim_{x \to a} f(x)$ cannot exist.

b) $\lim_{x \to a} f(x)$ could be zero.

c) $\lim_{x \to a} f(x)$ must approach ∞

d) None of the above are true.

Recall that we defined the *instantaneous velocity* as the limit of the average rate of change of position.

Can the average rate of change on an interval $[1, 2]$ equal the instantaneous velocity at $t = 1$?

a) Yes

b) No

Order derivative values

For the function $g(x)$ shown below, arrange the following numbers in increasing order.

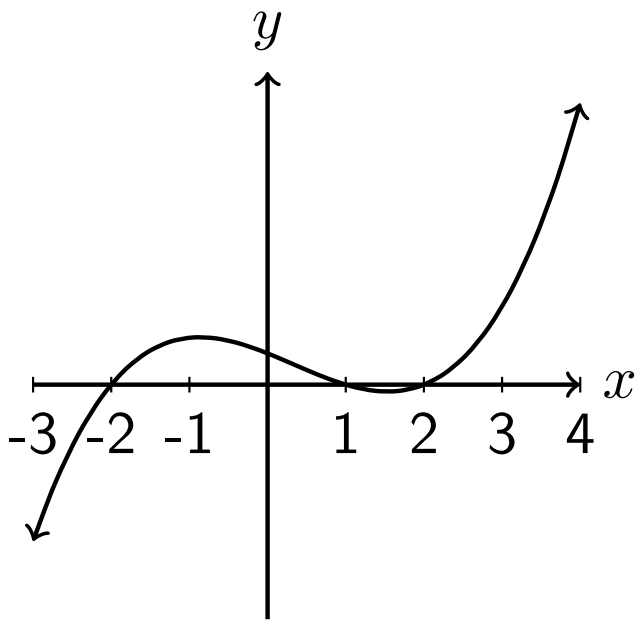
a) 0

b) $g'(-2)$

c) $g'(0)$

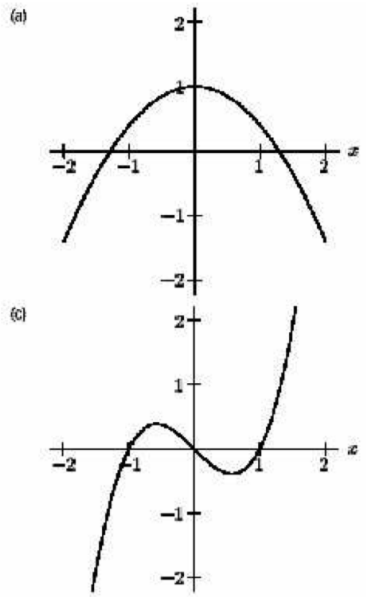
d) $g'(1)$

e) $g'(3)$



Derivative Function I

1. Which of the following graphs is the graph of the derivative of the function shown in Figure 2.6?



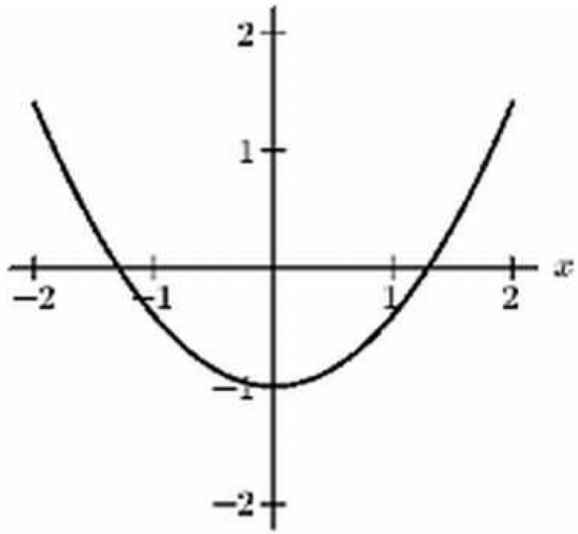
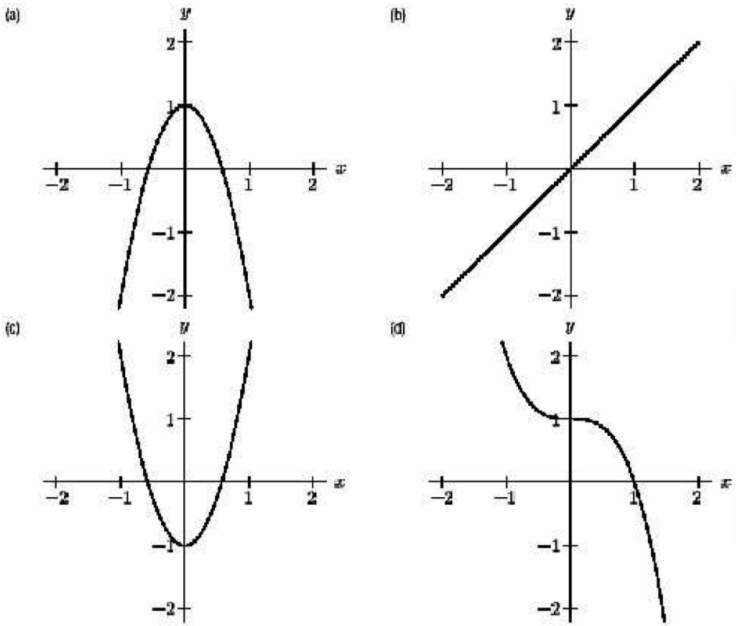


Figure 2.6

Derivative Function II

2. Which of the following graphs is the graph of the derivative of the function shown in Figure 2.8?



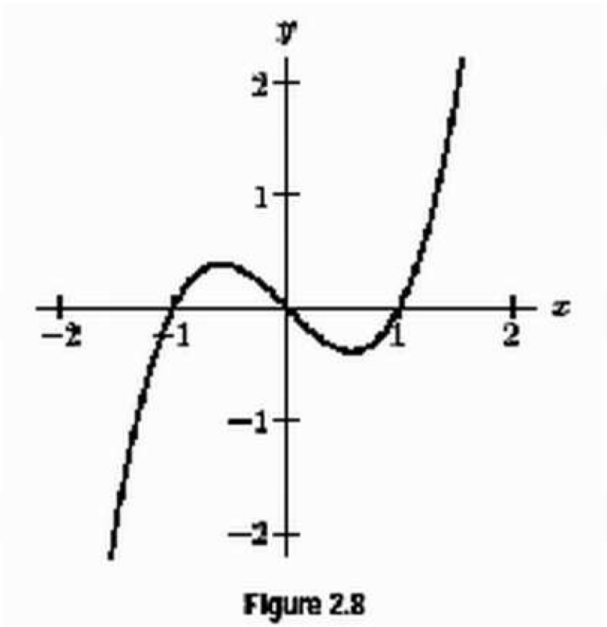


Figure 2.8

13. If $f(x) = x^2 + \frac{3}{x}$, then what is $f'(x)$?

(a) $2x - 3x^{-2}$

(b) $2x + 3x^{-1}$

(c) $2x - 3x^2$

(d) $x^2 - 3x^{-1}$

Derivative Rules II

If $f(x) = \pi^2$, then what is $f'(x)$?

(a) 2π

(b) π^2

(c) 0

(d) 2

Derivative Rules III

The deriviative of the function $f(x) = e^{x+2}$ is

a) $(x+2)e^{x+1}$
b) $e^2 e^x$
c) e^2
d) 0
e) Cannot be determined from what we know

Derivative Rules IV

The 10th derivative of $\sin x$ is

(a) $\sin x$

(b) $\cos x$

(c) $-\sin x$

(d) $-\cos x$

Product Rule I

1. $\frac{d}{dx}\left(x^2e^x\right) =$

   (a) $2xe^x$

   (b) x^2e^x

   (c) $2xe^x + x^2e^{x-1}$

   (d) $2xe^x + x^2e^x$

Product Rule II

5. When differentiating a constant multiple of a function (like $3x^2$) the Constant Multiple Rule tells us $\frac{d}{dx}cf(x) = c\frac{d}{dx}f(x)$ and the Product Rule says $\frac{d}{dx}cf(x) = c\frac{d}{dx}f(x) + f(x)\frac{d}{dx}c$. Do these two rules agree?

   (a) Yes, they agree, and I am very confident.

   (b) Yes, they agree, but I am not very confident.

   (c) No, they do not agree, but I am not very confident.

   (d) No, they do not agree, and I am very confident.

Quotient Rule I

11. $\frac{d}{dt}\frac{\sqrt{t}}{t^2+1} =$

(a) $\frac{\frac{1}{2}t^{-1/2}-2t}{(t^2+1)^2}$

(b) $\frac{\frac{1}{2}t^{-1/2}t^2-2t\sqrt{t}}{(t^2+1)^2}$

(c) $\frac{\frac{1}{2}t^{-1/2}(t^2+1)-2t\sqrt{t}}{(t^2+1)^2}$

(d) $\frac{t^{-1/2}(t^2+1)-2t\sqrt{t}}{(t^2+1)^2}$

Product Rule III

12. If $f(3) = 2$, $f'(3) = 4$, $g(3) = 1$, $g'(3) = 3$, and $h(x) = f(x)g(x)$, then what is $h'(3)$?

(a) 2

(b) 10

(c) 11

(d) 12

(e) 14

Product Rule IV

14. If $h = \frac{ab^2e^b}{c^3}$ then what is $\frac{dh}{db}$?

(a) $\frac{2abe^b}{c^3}$

(b) $\frac{2abe^b}{3c^2}$

(c) $\frac{2abe^b + ab^2e^b}{c^3}$

(d) $\frac{2abe^bc^3 - 3c^2ab^2e^b}{c^6}$

Chain Rule I

3. $\frac{d}{dx}\sqrt{1-x} =$

(a) $\frac{1}{2}(1-x)^{-1/2}$

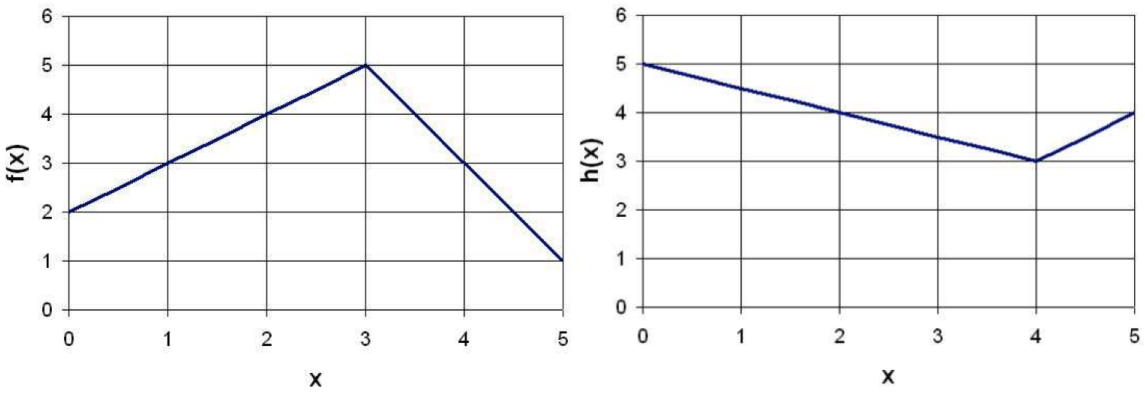
(b) $-\frac{1}{2}(1-x)^{-1/2}$

(c) $-(1-x)^{-1/2}$

(d) $-\frac{1}{2}(1-x)^{1/2}$

Chain Rule II

12. The functions $f(x)$ and $h(x)$ are plotted below. The function $g(x) = f(h(x))$. What is $g'(2)$?



(a) $g'(2) = -\frac{1}{2}$

(b) $g'(2) = 1$

(c) $g'(2) = 3$

(d) $g'(2) = 4$

(e) $g'(2)$ is undefined