Clicker Questions

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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.

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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

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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) $g'(3)$

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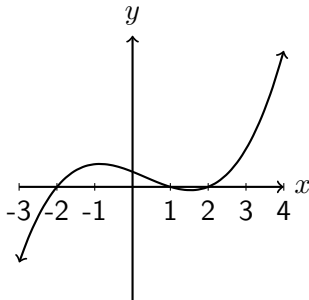
1. Which of the following graphs is the graph of the derivative of the function shown in Figure 2.6?
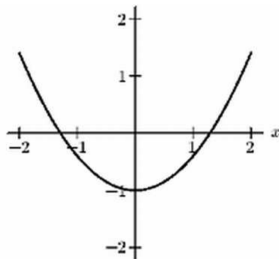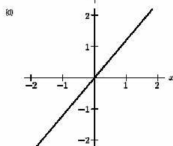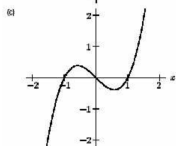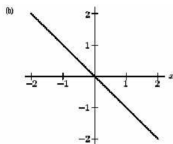

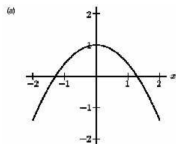Figure 2.6

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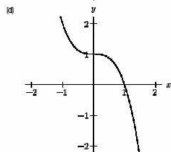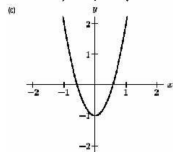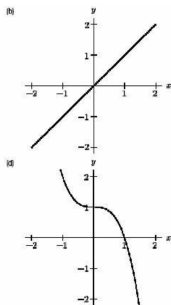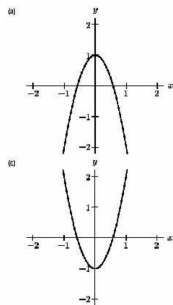
Figure 2.8

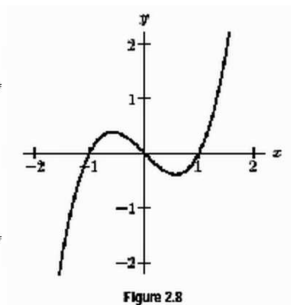13. If $f(x) = x^2 + \frac{3}{x}$, then what is $f'(x)$?

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

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

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

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

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

(a) 2π

(b) π^2

(c) 0

(d) 2

Derivative Rules III

The derivative 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

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The 10th derivative of $\sin x$ is

(a) $\sin x$

(b) $\cos x$

(c) $-\sin x$

(d) $-\cos x$

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

    (a) $2xe^x$

    (b) $x^2 e^x$

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

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

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.

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

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

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

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

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

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

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

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

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

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

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

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

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

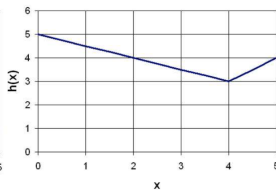   (b) $-\frac{1}{2}(1-x)^{-1/2}$
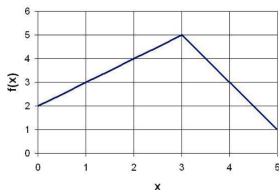
    (c) $-(1-x)^{-1/2}$

    (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

Inverse Functions I

The derivative of the function $f(z) = \ln(z^2 + 1)$ is

a) $2z \ln(z^2 + 1)$

b) $\dfrac{2z}{z^2 + 1}$

c) $\dfrac{-1}{z^2 + 1}$

d) None of the above

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10. If $q = a^2 \ln(a^3 c \sin b + b^2 c)$, then $\frac{dq}{db}$ is

(a) $\dfrac{a^2}{a^3 c \sin b + b^2 c}$

(b) $\dfrac{a^5 c \cos b + 2a^2 bc}{a^3 c \sin b + b^2 c}$

(c) $\dfrac{a^3 c \cos b + 2bc}{a^3 c \sin b + b^2 c}$

(d) $\dfrac{6a^3 \cos b + 4ab}{a^3 c \sin b + b^2 c}$

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Implicit Differentiation

The derivative of the implicit function $x^3 + y^3 - 9xy = 0$ is

a) $\dfrac{dy}{dx} = \dfrac{-3x^2 - y}{y^2 - 3x}$

b) $\dfrac{dy}{dx} = \dfrac{x^2}{y^2 + 3x}$

c) $\dfrac{dy}{dx} = \dfrac{3y - x^2}{y^2 - 3x}$

d) $\dfrac{dy}{dx} = -\dfrac{x^2 + y}{y^2 + 3x}$

e) None of the above

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