Derivative Rules I: Basic (10862442)

Due: Wed Sep 6 2017 07:30 AM MDT

Question 1

Find the derivative of the following constant.
\[ \frac{d}{dx}(13) = \]

Question 2

Use the power rule
\[ \frac{d}{dx}(x^n) = nx^{n-1} \]

to find the following derivatives

a. \[ \frac{d}{dx}(x^3) = \]

b. \[ \frac{d}{dx}(x^{1/3}) = \]

c. \[ \frac{d}{dx}(x^{-3}) = \]

Instructions
Read today's Notes and Learning Goals.
3. Question Details

Use the **power rule**

\[ \frac{d}{dx}(x^n) = nx^{n-1} \]

to find the following derivatives

a. \[ \frac{d}{dx}(x^8) = \] 

b. \[ \frac{d}{dx}\left(\frac{1}{x^5}\right) = \] 

**Hint:** \( \frac{m}{\sqrt{x^n}} = x^{m/n} \)

c. \[ \frac{d}{dx}(\frac{1}{x^3}) = \] 

**Hint:** \( \frac{1}{x^n} = x^{-n} \)

**Practice Another Version.** Click on the Practice Another Version button (near the Submit Button for this question) and you can try another random problem of this type. **Try to get three random versions correct in a row.**

4. Question Details

Use the **Linearity Rule**

\[ \frac{d}{dx}(af + bg) = a\frac{df}{dx} + b\frac{dg}{dx} \]

where \( a \) and \( b \) are constants and \( f \) and \( g \) are functions of \( x \) to find the following derivatives

a. \[ \frac{d}{dx}(-16x^2 + 40x + 100) = \] 

b. \[ \frac{d}{dx}(x^3 - \frac{1}{x^3}) = \]

5. Question Details

Use the **Linearity Rule**

\[ \frac{d}{dx}(af + bg) = a\frac{df}{dx} + b\frac{dg}{dx} \]

where \( a \) and \( b \) are constants and \( f \) and \( g \) are functions of \( x \) to find the following derivatives

a. \[ \frac{d}{dx}(15x^4 - 8x^3 + 85) = \] 

b. \[ \frac{d}{dx}\left(18\sqrt{x} - \frac{11}{x^2}\right) = \]

**Practice Another Version.** Click on the Practice Another Version button (near the Submit Button for this question) and you can try another random problem of this type. **Try to get three random versions correct in a row.**
6. **Question Details**

Use the **Exponential Rule**

\[
\frac{d}{dx}(e^x) = e^x
\]

to find the following derivatives

a. \( \frac{d}{dx}(-11e^x) = \)

b. \( \frac{d}{dx}(7x^6 - 33e^x + 32) = \)

**Practice Another Version. Try to get three random versions correct in a row.**

7. **Question Details**

Find the derivative of the following.

\[
\frac{d}{dx}(e - e^x + x^e) =
\]

8. **Question Details**

Find the following derivative

\[
\frac{d}{dx} \left( \frac{32}{x^4} - \frac{8}{\sqrt{x^4}} \right) =
\]

**Practice Another Version. Try to get five random versions correct in a row.**
9. Question Details

Suppose the derivative of a function is given as
\[
\frac{df}{dx} = x^3
\]

a. Four students guess what the original function \( f \) is. Take the derivative of each of the students' guess to check them.

- **Alice** guesses that \( f(x) = 3x^2 \).
  
  Check:

- **Bob** guesses that \( f(x) = 3x^4 \).
  
  Check:

- **Chris** guesses that \( f(x) = \frac{1}{3}x^4 \).
  
  Check:

- **Dani** guesses that \( f(x) = \frac{1}{4}x^4 \).
  
  Check:

b. Which of the four students was correct?

- [ ] Alice
- [ ] Bob
- [ ] Chris
- [ ] Dani
Suppose the derivative of a function is given as
\[
\frac{df}{dx} = \sqrt{x}
\]

a. Four students guess what the original function \( f \) is. Take the derivative of each of the students' guesses to check them.

- **Alice** guesses that \( f(x) = \frac{1}{2}x^{3/2} \).
  
  Check: 

- **Bob** guesses that \( f(x) = \frac{2}{3}x^{3/2} \).
  
  Check: 

- **Chris** guesses that \( f(x) = -2x^{-1/2} \).
  
  Check: 

- **Dani** guesses that \( f(x) = \frac{1}{2}x^{-1/2} \).
  
  Check: 

b. Which of the four students was correct?

- [ ] Alice
- [ ] Bob
- [ ] Chris
- [ ] Dani
11. Question Details

Suppose the derivative of a function is given as

\[ \frac{df}{dx} = 5 - 5e^x \]

a. Four students guess what the original function \( f \) is. Take the derivative of each of the students guess to check them.

- **Alice** guesses that \( f(x) = 5x - 5e^x + 5 \).

Check: 

- **Bob** guesses that \( f(x) = -5e^x \).

Check: 

- **Chris** guesses that \( f(x) = 5x - 5e^x \).

Check: 

- **Dani** guesses that \( f(x) = \frac{5}{x} - 5e^x \).

Check: 

b. Which of the four students was correct?

- [ ] Alice
- [ ] Bob
- [ ] Chris
- [ ] Dani

12. Question Details

Suppose that \( f \) is a function such that its derivative is

\[ \frac{df}{dx} = x^6 \]

Find any function that satisfies the above derivative.

\[ f(x) = \]

**Practice Another Version. Try to get three random versions correct in a row.**
Suppose that \( f \) is a function such that its derivative is
\[
\frac{df}{dx} = 16e^x - 15 + 8x
\]

Find any function that satisfies the above derivative.

\[
f(x) = 
\]

**Practice Another Version. Try to get three random versions correct in a row.**