Classroom Voting Questions: Calculus I

3.3 The Product and Quotient Rules

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

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

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

   (a) $xe^x + x^2e^x$
   (b) $e^x + xe^x$
   (c) $2xe^x + xe^x$
   (d) e^x

3. $\frac{d}{dt}\left(\left(t^2+3\right)e^t\right) =$

   (a) $2te^t + \left(t^2+3\right)e^t$
   (b) $\left(2t+3\right)e^t + \left(t^2+3\right)e^t$
   (c) $2te^t$
   (d) $2te^t + t^2e^t$
   (e) $\left(t^2+3\right)e^t$

4. $\frac{d}{dx}\left(x^34^x\right) =$

   (a) $3x^24^x \ln 4$
   (b) $x^34^x + x^34^x \ln 4$
   (c) $3x^24^x + x^34^x$
   (d) $3x^24^x + x^34^x \ln 4$

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.

   (b) No, they do not agree.

6. $\frac{d}{dx}\frac{x}{e^x} =$

   (a) $e^x + xe^x$

   (b) $\frac{e^x - xe^x}{e^{2x}}$

   (c) $\frac{xe^x - e^x}{x^2}$

   (d) $\frac{xe^x - e^x}{e^{2x}}$

7. $\frac{d}{dx}\frac{x^{1.5}}{3^x} =$

   (a) $\frac{1.5x^{0.5} - 3^x \ln 3}{3^{2x}}$

   (b) $\frac{1.5x^{0.5}3^x - x^{1.5}3^x \ln 3}{3^{2x}}$

   (c) $\frac{1.5x^{0.5}3^x - x^{1.5}3^x \ln 3}{1.5x^{0.5}}$

   (d) $1.5x^{0.5}3^x + x^{1.5}3^x \ln 3$

8. If $e^a - \frac{b}{a^2} = 5$, find $\frac{db}{da}$.

   (a) $\frac{db}{da} = e^a$

   (b) $\frac{db}{da} = a^2e^a$

   (c) $\frac{db}{da} = a^2e^a - 5a^2$

   (d) $\frac{db}{da} = 2ae^a + a^2e^a - 10a$

   (e) $\frac{db}{da} = 2ae^a + a^2e^a - 10ae^a - 5a^2e^a$

   (f) Cannot be determined from this expression

9. $\frac{d}{dx}\left(25x^2e^x\right) =$

   (a) $50x^2e^x + 25x^2e^x$

   (b) $25xe^x + 25x^2e^x$

   (c) $50xe^x + 25x^2e^x$

   (d) $50xe^x + 25xe^x$

10. $\frac{d}{dt}\frac{3t+1}{5t+2} =$

(a) $\frac{3(5t+2)-(3t+1)5}{(5t+2)^2}$

(b) $\frac{3(5t+2)-(3t+1)5}{(3t+1)^2}$

(c) $\frac{(3t+1)(5t+2)-(3t+1)5}{(5t+2)^2}$

(d) $\frac{3(5t+2)-(3t+1)(5t+2)}{(5t+2)^2}$

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

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

13. If $f(3) = 2$, $f'(3) = 4$, $g(3) = 1$, $g'(3) = 3$, and $h(x) = \frac{f(x)}{g(x)}$, then what is $h'(3)$?

(a) -2

(b) 2

(c) $\frac{-2}{9}$

(d) $\frac{2}{9}$

(e) 5

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

15. My old uncle Stanley has a collection of rare and valuable books: He has a total of 4,000 books, that are worth an average of \$60 each. His books are rising in value over time, so that each year, the average price per book goes up by \$0.50. However he also has to sell 30 books per year in order to pay for his snowboarding activities. The value of the collection is

    (a) increasing by approximately \$240,000 per year.

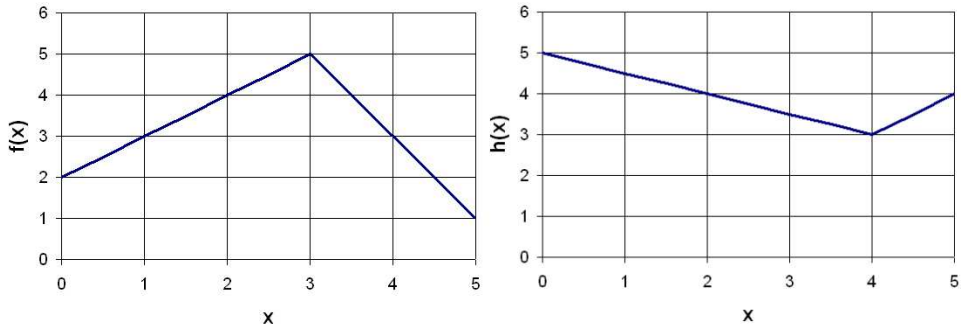
    (b) increasing by approximately \$2000 per year.

    (c) increasing by approximately \$200 per year.

    (d) decreasing by approximately \$1,800 per year.

    (e) decreasing by approximately \$119,970 per year.

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



    (a) $g'(2) = -1$

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

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

    (d) $g'(2) = 32$