

# Classroom Voting Questions: Calculus I

## 3.3 The Product and Quotient Rules

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

(a)  $2xe^x$

(b)  $x^2e^x$

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

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

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

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

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

(c)  $2xe^x + xe^x$

(d)  $e^x$

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

(a)  $2te^t + (t^2 + 3)e^t$

(b)  $(2t + 3)e^t + (t^2 + 3)e^t$

(c)  $2te^t$

(d)  $2te^t + t^2e^t$

(e)  $(t^2 + 3)e^t$

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

(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, 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.

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

- (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

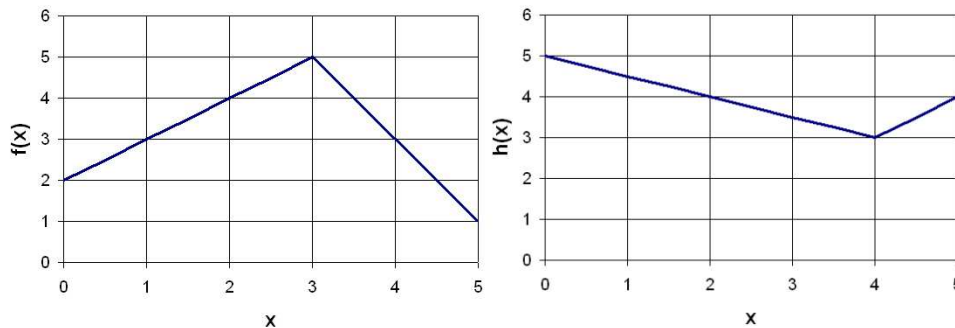
14. If  $h = \frac{ab^2e^b}{c^3}$  then what is  $\frac{dh}{db}$ ?

- (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)  $g'(2) = 32$
- (e) None of the above