

GSB 420
Homework #2a: Calculus

1. $Y = 2X + 4$

- a. $\frac{dY}{dX} = Y' = 2$
- b. $\frac{dY}{dX} = Y' = 2X^0$
- c. $\frac{dY}{dX} = Y' = 2X$
- d. only (a) and (b) of the above
- e. none of the above

2. $Y = 25X^2 - 25X + 25$

- a. $Y' = 2 \cdot 25X - 25$
- b. $Y' = 50X - 25$
- c. $Y' = 50X - 25X^0$
- d. all of the above
- e. none of the above

3. $Y = aX^n + bX^m - cX + d$

- a. $Y' = anX^n + mbX^m - cX$
- b. $Y' = anX^{n-1} + mbX^{m-1} - 1$

4. $Y = \frac{2}{3}X^3 + \frac{5}{4}X^2 - \frac{2}{5}X^0$

a. $Y' = 2X^2 + 2.5X$

b. $Y' = \frac{2}{3}X^2 + \frac{5}{2}X - \frac{2}{5}$

c. $Y' = \frac{2}{3}X^2 + \frac{5}{2}X$

d. $Y' = \frac{2}{3 \cdot 3}X^2 + \frac{5}{2}X$

e. $Y' = 2X^2 - 2.5X$

5. $Y = 20X^5X^3X^2$

a. $Y' = 5 \cdot 20X^4X^3X^2$

b. $Y' = 3 \cdot 5 \cdot 20X^4X^2X^2$

c. $Y' = 2 \cdot 3 \cdot 5 \cdot 20X^4X^2X$

d. $Y' = 200X^{10}$

e. $Y' = 200X^9$

6. $Y = 5X^3(2X + 3)$

a. $Y' = 10X^4 + 15X^3$

b. $Y' = 40X^3 + 45X^2$

- c. $Y' = 15X^2 \cdot (2X + 3)$
- d. only (a) and (b) of the above
- e. none of the above

7. $Y = 2(X^2 - 3X - 1)(X + 2)$

- a. $Y' = (2X^2 - 6X - 2)(X + 2)$
- b. $Y' = 2X^3 - 2X^2 - 14X$
- c. $Y' = 6X^2 - 4X - 14$
- d. only (a) and (b) of the above
- e. none of the above

8. $Y = \frac{25}{X-1}$ (Hint: Use the quotient rule)

- a. $Y' = -\frac{25}{(X-1)^2}$
- b. $Y' = \frac{25}{(X-1)^2}$
- c. $Y' = -\frac{25}{(X-1)}$
- d. $Y' = \frac{25}{(X-1)}$
- e. $Y' = 0$

9. $Y = \frac{25X + 2}{X^2 + 2}$ (Hint: Use the quotient rule)

a.
$$Y' = \frac{25X^2 + 4X - 50}{(X^2 + 2)}$$

b.
$$Y' = \frac{-25X^2 - 4X + 50}{(X^2 + 2)^2}$$

c.
$$Y' = \frac{-25X^2 - 4X + 50}{(2X)^2}$$

d.
$$Y' = \frac{25X^2 + 4X - 50}{(X^2 + 2)^2}$$

e. none of the above

10.
$$Y = \frac{5X^2 - 2X + 1}{X}$$
 (Hint: Use the reduction/simplification method)

a.
$$Y' = \frac{5X^2 - 1}{X^2}$$

b.
$$Y' = 5 - X^{-2}$$

c.
$$Y' = \frac{10X - 2}{X^2}$$

d. only (a) and (b) of the above

e. none of the above

Find the SECOND derivative of the following functions with respect to X:

11.
$$Y = 3X^2 - 2X + 5$$

a.
$$Y'' = 6X - 2$$

b.
$$Y'' = 6$$

c.
$$Y'' = 2 \cdot 3X^2 - 1 \cdot 2X$$

- d. $Y'' = 6X$
- e. none of the above

12. $Y = aX^n - bX^{-m} + c$
- a. $Y'' = naX^{n-1} + mbX^{-m-1}$
 - b. $Y'' = (n-1)naX^{n-2} + (-m-1)mbX^{-m-2}$
 - c. $Y'' = naX^{n-2} + mbX^{-m-2}$
 - d. only (a) and (c) of the above
 - e. none of the above

13. $Y = 4(X-1)^2$ (Hint: Use the reduction/simplification method)
- a. $Y'' = 8X - 8$
 - b. $Y'' = 8X$
 - c. $Y'' = 8X + 8$
 - d. $Y'' = 8$
 - e. none of the above

14. $Y = 2(X+1)X^{-0.5}$ (Hint: Use the reduction/simplification method)
- a. $Y'' = -0.5X^{-1.5} + 1.5X^{-2.5}$
 - b. $Y'' = 2X^{-0.5} - (X+1)X^{-1.5}$
 - c. $Y'' = X^{-0.5} - X^{-1.5}$
 - d. only (b) and (c) of the above
 - e. none of the above

15. $Y = 2\sqrt{X}$

- a. $Y'' = X^{-0.5}$
- b. $Y'' = \frac{1}{\sqrt{X}}$
- c. $Y'' = -0.5X^{-1.5}$
- d. only (a) and (b) of the above
- e. none of the above

16. $Y = 6\sqrt[3]{X}$

- a. $Y'' = 2X^{-2/3}$
- b. $Y'' = -\frac{4}{3}X^{-5/3}$
- c. $Y'' = -\frac{4}{3}X^{1/3}$
- d. only (b) and (c) of the above
- e. none of the above

17. $Y = \frac{1}{X}$

- a. $Y'' = -X^{-2}$
- b. $Y'' = 2X^{-3}$
- c. $Y'' = \frac{2}{X^3}$
- d. only (b) and (c) of the above
- e. all of the above

18.
$$Y = \frac{X^2 - 1}{2X}$$

a.
$$Y'' = \frac{1}{2} \cdot X - \frac{1}{2} X^{-1}$$

b.
$$Y'' = 0.5 + 0.5X$$

c.
$$Y'' = \frac{2X^2 + 2}{4X^2}$$

d.
$$Y'' = -\frac{1}{X^3} = -X^{-3}$$

e. all of the above

19.
$$Y = \frac{X+1}{X-1}$$

a.
$$Y'' = -\frac{2}{(X-1)^2}$$

b.
$$Y'' = \frac{4X-4}{(X-1)^4}$$

c.
$$Y'' = \frac{4}{(X-1)^3}$$

d. only (b) and (c) of the above

e. all of the above

20.
$$Y = \frac{2X-3}{3X^2}$$

a.
$$Y'' = \frac{-6X^2 + 18X}{9X^4} = \frac{-2X + 6}{3X^3}$$

b.
$$Y'' = \frac{6X^5 - 18X^4}{9X^8} = \frac{2X - 9}{3X^4}$$

c.
$$Y'' = \frac{12X^5 - 54X^4}{9X^8} = \frac{4X - 18}{3X^4}$$

d. only (b) and (c) of the above

e. none of the above