

The Weekly Rigor

No. 229

“A mathematician is a machine for turning coffee into theorems.”

November 10, 2018

20 Problems in Calculating Type 4 Difference Quotients

(Part 1)

$$\frac{f(x) - f(a)}{x - a}$$

PROBLEMS

1. $f(x) = x$

2. $f(x) = x^2$

3. $f(x) = x^3$

4. $f(x) = 2x^3$

5. $f(x) = 2x^2 + 5$

6. $-5x^2 + 3x$

7. $f(x) = x^3 - 2x^2 + 3$

8. $f(x) = 3x^2 - 5x + 4$

9. $f(x) = mx + b$

10. $f(x) = px^2 + qx + r$

11. $f(x) = \frac{1}{x}$

12. $f(x) = \frac{1}{x+2}$

13. $f(x) = \frac{7}{x+2}$

14. $f(x) = \frac{7}{5x+2}$

15. $f(x) = \sqrt{x}$

16. $f(x) = \sqrt{x-3}$

17. $f(x) = \sqrt{x^2+1}$

18. $f(x) = \sqrt{3x^2+x}$

19. $f(x) = \frac{1}{\sqrt{x}}$

20. $f(x) = \frac{1}{\sqrt{x+2}}$

ANSWERS

1. 1	2. $x+a$
3. x^2+ax+a^2	4. $2x^2+2ax+2a^2$
5. $2(x+a)$	6. $-5x-5a+3$
7. $x^2+ax+a^2-2x-2a$	8. $3x+3a-5$
9. m	10. $px+pa+q$
11. $\frac{-1}{ax}$	12. $\frac{-1}{(a+2)(x+2)}$
13. $\frac{-7}{(a+2)(x+2)}$	14. $\frac{-35}{(5x+2)(5a+2)}$
15. $\frac{1}{\sqrt{x}+\sqrt{a}}$	16. $\frac{1}{\sqrt{x-3}+\sqrt{a-3}}$
17. $\frac{x+a}{\sqrt{x^2+1}+\sqrt{a^2+1}}$	18. $\frac{3x+3a+1}{\sqrt{3x^2+x}+\sqrt{3a^2+a}}$
19. $\frac{-1}{\sqrt{a}\sqrt{x}(\sqrt{a}+\sqrt{x})}$	20. $\frac{-1}{\sqrt{a+2}\sqrt{x+2}(\sqrt{a+2}+\sqrt{x+2})}$

“Only he who never plays, never loses.”