

Activity Workbook for MTH 20

Fundamentals of Mathematics

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Chapter 1

Activity 1

Preparation

Read the syllabus and answer the following questions:

Limit Building Blocks and Composite Functions

This section is just a wrapper for the actual worksheet.

Limit Building Blocks and Composite Functions

Exercise Group. Use the *substitution method* to evaluate the following limits.

1. $\lim_{y \rightarrow \pi/3} \sin(y)$

2. $\lim_{t \rightarrow 3} t^{-1/4}(t+5)^{1/3}$

Answer. $\frac{\sqrt{3}}{2}$

Solution. Since \sin is a continuous function,

$$\begin{aligned}\lim_{y \rightarrow \pi/3} \sin(y) &= \sin(\pi/3) \\ &= \frac{\sqrt{3}}{2}\end{aligned}$$

Exercise Group. What do the following limits evaluate to?

3. $\lim_{x \rightarrow 0} \frac{1}{x}$

4. $\lim_{x \rightarrow \infty} \frac{1}{x}$

5. $\lim_{x \rightarrow 0^+} \ln(x)$

6. $\lim_{x \rightarrow \infty} \ln(x)$

7. $\lim_{x \rightarrow -\infty} \ln(x)$

8. $\lim_{x \rightarrow -\infty} e^x$

9. $\lim_{x \rightarrow \infty} e^x$

10. $\lim_{x \rightarrow 0} \frac{1}{x^2}$

11. $\lim_{x \rightarrow \infty} \frac{1}{x^2}$

12. $\lim_{x \rightarrow \infty} \sqrt{x}$

13. $\lim_{x \rightarrow 0^+} \sqrt{x}$

14. $\lim_{x \rightarrow 0} \sqrt{x}$

15. $\lim_{x \rightarrow \pi/2^-} \tan(x)$

16. $\lim_{x \rightarrow -\pi/2^+} \tan(x)$

17. $\lim_{x \rightarrow \infty} \arctan(x)$

18. $\lim_{x \rightarrow -\infty} \arctan(x)$

Exercise Group. Evaluate the following limits involving composite functions.

19. $\lim_{x \rightarrow \infty} \sin(\arctan(x))$

20. $\lim_{x \rightarrow 0^+} e^{1/x}$

21. $\lim_{x \rightarrow 0} \ln(\sin(x))$

22. $\lim_{x \rightarrow \infty} \frac{1}{\ln(x)}$

23. $\lim_{x \rightarrow 0^+} \frac{1}{\ln(x)}$

24. $\lim_{x \rightarrow -\infty} e^{x^2}$

Exercise Group. Evaluate the following limits involving composite functions.

25. $\lim_{x \rightarrow 0^-} \ln(x^2)$

26. $\lim_{x \rightarrow -\infty} \sqrt{e^x}$

27. $\lim_{x \rightarrow \infty} \frac{1}{\sin(x)}$

28. $\lim_{x \rightarrow 0^-} \frac{1}{\sin(x)}$

29. $\lim_{x \rightarrow 2} \frac{1}{(x-2)^2}$

30. $\lim_{x \rightarrow 2} \frac{1}{x-2}$

Colophon

This book was authored in PreTeXt.