

Calculus Placement Exam Practice Problems

Exam Instruction: This is a set of practice problems for the Calculus Placement Exam. The proctored Calculus Placement Exam offered in August will be different from this sample exam. **It will include 24 multiple choice questions, with no partial credit for showing work.** The exam is one hour. **No calculator is allowed during the exam.**

How to interpret your exam result: Discuss your sample exam experience with your academic advisor during new student orientation before making any final enrollment decisions. Check your answers against the linked answer key after completing the sample exam.

- If you answered 20 – 24 questions correctly, we recommend MATH–M 212 Calculus 2 or MATH–S 212 Honors Calculus 2. You may now request permission to add one of these courses during new student orientation using the webform at <https://math.indiana.edu/forms/permission-to-add-200-level-course.html>.

Note: Please plan to take the proctored Calculus Placement Exam on campus in August to verify your results. This sample exam is only to help you make decisions about your fall enrollment plans with the help of your academic advisor during new student orientation. The Mathematics department will grant permission requests through the link above based on your self-reported results on the sample exam. However, the department reserves the right to administratively drop you from MATH–M 212 or MATH–S 212 if you do not also take the proctored exam in August (or fulfill the Calculus 1 prerequisite in another manner such as AP credit or transfer credit or dual credit).

- If you answered 18 or 19 questions correctly, then we recommend MATH–S 211 Honors Calculus 1. You may now request permission to add this course during new student orientation using the webform at: <https://math.indiana.edu/forms/permission-to-add-200-level-course.html>
- If you answered fewer than 18 questions correctly and have an ALEKS score of 70 or higher, then we recommend MATH–M 211 Calculus 1. You should not need a separate permission to add this course during new student orientation.
- If you answered fewer than 18 questions correctly and have an ALEKS score below 70, then we recommend MATH–M 27 Precalculus and Trigonometry. You should not need a separate permission to add this course during new student orientation.

1. If $\left(\frac{1}{2}\right)^{\frac{x}{15}} = \frac{1}{3}$, find the value of x .
2. If $y = \frac{e^x}{1 + e^x}$, solve for x .
3. If $\log_5 x + \log_5 9x = 2$, solve for x .
4. Evaluate $\lim_{x \rightarrow 4} \frac{x^2 - 5x + 4}{x^2 - 4x}$.
5. Evaluate $\lim_{x \rightarrow \infty} \sqrt{\frac{x + 3x^2}{x^2 + 1}}$.
6. Evaluate $\lim_{x \rightarrow \pi/2} \sin\left(\frac{x}{3} + \cos x\right)$.
7. Find the equation of the line tangent to the graph of $y = \ln x$ at $x = e^3$.
8. Let $f(x) = \sqrt{x^2 + 1}$, find $f'(x)$.
9. Let $f(x) = \sin^2 x$, find $f'(\pi/4)$.
10. Let $y = x^3 \cos(2x)$, find $\frac{dy}{dx}$.
11. Let $y = \frac{x^2 + 1}{x - 1}$, find $\frac{dy}{dx}$.
12. Let $f(x) = \sqrt{x}$, evaluate $\frac{f(x+h) - f(x)}{h}$.
13. Given the implicit equation $\sin(y) = xy + x^2$, find $\frac{dy}{dx}$.
14. Let $f(x) = x + e^{-2x}$, find the interval on which $f(x)$ is increasing.
15. Let $f(x) = x^2 + \ln(3x)$, find the inflection point of $f(x)$.
16. Evaluate $\lim_{\theta \rightarrow 0} \frac{\sin(2\theta)}{3\theta}$.
17. Let $f(x) = x^3 - 3x^2 - 9x + 1$, find the x value at which $f(x)$ has a local minimum.
18. Evaluate the indefinite integral $\int (1 + \tan x)^3 \sec^2 x \, dx$.
19. Evaluate the indefinite integral $\int \frac{e^{\sqrt{x}}}{\sqrt{x}} \, dx$.

20. Evaluate the indefinite integral $\int \frac{x^2}{1+x^3} dx$.
21. For what value of b is the definite integral $\int_1^b \frac{3}{x^2} dx = 1$.
22. If $F'(x) = 2x^3 + \frac{1}{x}$ and $F(1) = 2$, find $F(x)$.
23. Find the area bounded between the curves $y = x^2 - 1$ and $y = 1 - x$.
24. Set up the integral to find the volume of the solid obtained by revolving the region enclosed by the curves $y = 2x^2 + 1$ and $y = x^2 + 5$ about the x -axis.