

Topics and Practice Problems for the Calculus (MCALC) Placement Test

General Information: The exam consists of 25 multiple choice questions. Problems generally fall into one of 4 categories – simplify, solve, identify or model. The problems below are representative of those on the exam, but the list is not necessarily complete. The wording of the actual problems may vary slightly.

Simplify

- $27^{1/3}16^{-1/2} =$
- $\frac{r^3 - s^3}{r^2 - s^2} =$
- Find $f(x + h)$ if $f(x) = \frac{2x + 1}{3 - x}$
- $\sin(x + h) =$
- $\cos x \tan x \csc^2 x =$

Solve

- $\log_3(2x - 1) = 2$
- $\frac{(x + 1)(2 - 1)}{x + 2} = 3$
- $-x^2 + 2x + 3 < 0$
- $|-2x - 4| \leq 6$
- $\sin 3x = \frac{1}{2}$ for $x \in [0, 2\pi]$

Identify

- Identify whether a given graph is even, odd or neither.
- Identify the graph of $y = x^2 + 4x - 1$ from a set of 4 choices.
- Identify the graph of $y = \left(\frac{1}{2}\right)^x$ from a set of 4 choices.
- Identify the graph of $y = \sec x$ from a set of 4 choices.
- Given the graph of a sinusoidal function, identify the formula from a set of 4 choices.

Model

- A colony of bacteria doubles in number every 4 hours. By what factor has the population grown after 12 hours?
- A lighthouse sits on the shore. There is a pier 3 miles due west of the lighthouse. A ship is due south of the lighthouse, and is 7 miles from the pier. How far from the lighthouse is the ship?
- If $3^6 \approx 700$, then 3^{12} is approximately equal to ... (pick one of 4 choices)
- Given the graph of a linear function, $y = mx + b$, identify whether m is positive or negative and whether b is positive or negative.
- Find an expression for the surface area of a rectangular box with top and bottom, for which the bottom is a square of side length x , and the height is h .
- Find an expression for the volume of a right circular cone for which the height is $1/2$ of the diameter of the base.
- A rectangle has area 100 m^2 . Its length is 4 m bigger than its width. Find the width.