

What you should know before taking *Math 220 (calculus 1)*

Students planning to enroll in Math 220 should first have a good understanding of the following concepts:

Basic understanding of functions:

- What is a function?
- Identify the function's domain and range.
- What are the zeros (roots) of a function?
- How to sketch a plot of a given function.
- How does a function's plot change if you modify it by adding a constant or by multiplying it by some constant number?
- Finding x-intercepts and y-intercepts.
- In which part of the domain is the real-valued function positive/negative?
- General behavior of linear functions ($f(x) = ax + b$), slope, y-intercept, etc.
- General behavior of exponential functions ($f(x) = e^{ax}$)
- General behavior of power functions ($f(x) = x^k$)
- General behavior of trigonometric functions ($f(x) = A \sin(Bx + C)$, $g(x) = A \cos(Bx + C)$, $h(x) = \tan(x)$).
- Solving basic systems of equations or inequalities.
- Factoring simple polynomials
- Quadratic formula.
- The nature of roots of quadratic equations, that is, when $b^2 - 4ac$ is > 0 , $= 0$, or < 0 .

Some examples:

- 1) Can there be a function $f(x)$, so that we have $f(2) = 3$ and $f(2) = 1$?
- 2) What is the domain and range for the following functions $f(x) = \sqrt{x}$, $f(x) = \sqrt{x^2}$, $f(x) = \frac{1}{x}$, $f(x) = \ln(x)$, $f(x) = x^2 + 3$
- 3) What are zeros (if any) of the functions $f(x) = 2x - 6$, $f(x) = x^2 - 2x$, $f(x) = e^x$, $f(x) = x^2 + 3$
- 4) Plot the functions $f(x) = x^2$, $f(x) = 2x^2$, $f(x) = (2x)^2$, $f(x) = x^2 - 5$, $f(x) = 2(x^2 - 5)$, $f(x) = (2x)^2 - 5$
- 5) For which values of x are the following functions positive and negative $f(x) = x^2 - 1$, $f(x) = x^2 - 4x + 3$, $f(x) = -e^x$, $f(x) = \ln(2x)$
- 6) Solve the following system of linear equations:
$$\begin{array}{rcl} 2x + y + z & = & 5 \\ x - y & = & 1 \\ x + z & = & 2 \end{array}$$
- 7) Solve the equation $x^2 + 2x - 3 = 0$ by factoring the polynomial.
- 8) Solve the equation $2x^2 - 3x - 4 = 0$ by using the quadratic formula.