



WeBWorK Functions

Mathematical Symbols Available In WeBWorK

- + Addition
- - Subtraction
- * Multiplication can also be indicated by a space or juxtaposition, e.g. $2x$, $2x$ or $2*x$, also $2(3+4)$.
- / Division
- ^ or ** You can use either ^ or ** for exponentiation, e.g. 3^2 or $3**2$
- Note, roots can be taken using exponents, so to get the fifth root of 17, use $17^{(1/5)}$.
- (and) You can also use square brackets, [], and braces, { }, for grouping, e.g. $[1+2]/[3(4+5)]$

Mathematical Constants Available In WeBWorK

- pi gives 3.14159265358979, e.g. $\cos(\pi)$ is -1
- e gives 2.71828182845905, e.g. $\ln(e*2)$ is $1 + \ln(2)$

Mathematical Functions Available In WeBWorK

- abs() The absolute value
- sqrt() Square root
- exp() The same function as e^x
- log() The logarithm with base 10
- logten() Another name for the logarithm with base 10
- ln() The natural logarithm (base e)
- sin() Note: sin() uses radian measure
- cos() Note: cos() uses radian measure
- tan() Note: tan() uses radian measure
- sec() Note: sec() uses radian measure
- arcsin()
- asin() Another name for arcsin
- arccos()
- acos() Another name for arccos
- arctan()
- atan() Another name for arctan
- sinh() Hyperbolic sine

- $\cosh()$ Hyperbolic cosine
- $\tanh()$ Hyperbolic tangent
- $\operatorname{sech}()$ Hyperbolic secant
- $\operatorname{sgn}()$ The sign function, either -1, 0, or 1
- $\operatorname{step}()$ The step function (0 if $x < 0$, 1 if $x \geq 0$)
- $\operatorname{fact}()$ The factorial function (defined only for non negative integers)

Syntax for entering expressions

- Be careful entering expressions just as you would be careful entering expressions in a calculator.
- Sometimes using the $*$ symbol to indicate multiplication makes things easier to read. For example $(1+2)*(3+4)$ and $(1+2)(3+4)$ are both valid. So are $3*4$ and $3\ 4$ (3 space 4, not 34) but using a $*$ makes things clearer.
- Use $()$'s and ${}_{}$'s to make your meaning clear. You can also use $[]$'s and $\{\}$'s and $\{\}$'s.
- Don't enter $2/4+5$ (which is 5.5) when you really want $2/(4+5)$ (which is $2/9$).
- Don't enter $2/3*4$ (which is $8/3$) when you really want $2/(3*4)$ (which is $2/12$).
- Entering big quotients with square brackets, e.g. $[1+2+3+4]/[5+6+7+8]$, is a good practice.
- Be careful when entering functions. It's always good practice to use parentheses when entering functions. Write $\sin(t)$ instead of $\sin t$ or $\sin t$. But WeBWork is smart enough to accept $\sin t$ or even $\sin t$. But $\sin 2t$ is really $\sin(2)t$, i.e. $(\sin(2))*t$. Be careful.
- Understand that $\sin^2 t$ is really short hand for $(\sin(t))^2$ and must be entered this way. Actually you could enter it as $\sin(t)^2$ or even $\sin^2 t$, but don't try such things unless you really understand the precedence of operations.
- For example $2+3\sin^2(4x)$ is wrong. You need to enter something like: $2+3(\sin(4x))^2$ or $2+3\sin(4x)^2$. Why does the last expression work? Because things in parentheses are always done first [i.e. $(4x)$], next all functions, such as \sin , are evaluated [giving $\sin(4x)$], next all exponents are taken [giving $\sin(4x)^2$], next all multiplications and divisions are performed [giving $3\sin(4x)^2$], and finally all additions and subtractions are performed [giving $2+3\sin(4x)^2$].
- The complete rules for the precedence of operations, in addition to the above, are
 - Multiplications and divisions are performed left to right: $2/3*4 = (2/3)*4 = 8/3$.
 - Additions and subtractions are performed left to right: $1-2+3 = (1-2)+3 = 2$.
 - Exponents are taken right to left: $2^3^4 = 2^{(3^4)} = 2^{81} = \text{a big number}$.
- Use the "Preview Button" to see exactly how your entry looks. E.g. to tell the difference between $1+2/3+4$ and $[1+2]/[3+4]$ click the "Preview Button".

Scientific Notation Available In WeBWork

- 2.1E2 gives 210
- 2.1E-2 gives .021

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