Introduction to the TI-82

**General Note:** Extra parentheses ( ), can it hurt but often necessary ones can. When in doubt, use parentheses.

### Getting Started
- **ON (black)**: Turns the calculator on
- **2nd (light blue)**: Accesses functions written in light blue
- **2nd ON = OFF**
- **2nd Δ**: Makes screen darker
- **2nd ▼**: Makes screen lighter
- **2nd MODE = QUIT**: Returns you to home screen
- **ALPHA (gray)**: Accesses characters written in white
- **CLEAR (black)**: Clears home screen
- **MODE (black)**: Accesses screen to adjust how information is displayed - usually first entries will be highlighted, but trig students will change between Radian and Degree mode

### Calculator Operations
- **+ (dark blue)**: Division
- **× (dark blue)**: Multiplication
- **− (dark blue)**: Subtraction
- **+ (dark blue)**: Addition
- **(−) (gray)**: Negative sign
  - **Caution:** − and (−) are not interchangeable
- **^ (black)**: Exponent
- **. (gray)**: Decimal point or period
- **ENTER (dark blue)**: Executes current expression

#### **Example:**
Evaluate: \(-5^3 + 2.5 \times 4\)
Keystrokes: \((-) 5 ^ 3 + 2.5 \times 4 \text{ ENTER} \quad -115\)

#### **Example:**
Evaluate: \(\sqrt{\text{something}}\)
Keystrokes: \(2 \text{nd } x^2 = \sqrt{\text{something}} \text{ ENTER}\)

#### **Example:**
Evaluate: \(\text{something} / x\)
Keystrokes: \(\text{x}^{-1} (\text{something} \div x) \text{ ENTER}\)

#### **Example:**
Evaluate: \(|x|\)
Keystrokes: \(2 \text{nd } \text{ABS} \text{ ENTER}\)

#### **Example:**
Evaluate: \(\frac{x}{2} + 3\)
Keystrokes: \(2 \text{nd } \frac{x}{2} + 3 \text{ ENTER} \quad 5.25\)

- **2nd (-) = ANS**: Recalls last answer in memory

- **2nd ∏ = π**: Uses 3.141592654 for π

#### **Example:**
Evaluate: \(\sqrt{3} + 2.1^2 + \pi\)
Keystrokes: \(2 \text{nd } (-) + 2 \text{nd } x^2 3 + 2.1^2 + \pi \text{ ENTER} \quad -9.324456539\)
### Math Menu Functions

| MATH 1 - Frac | Returns answer as a fraction |
| MATH 2 - Dec | Returns answer as a decimal |
| MATH 3 - 3  | Cubes preceding expression |
| MATH 4 - 1√ | Takes the cube root of the expression which follows |
| MATH 5 - 2√ | Takes the square root of the expression which follows |

**Caution:** Use parentheses when taking the root of a complex expression

#### Example:
Evaluate: \( \frac{\sqrt[3]{729}}{3} \)
Keystrokes: 6 MATH 5 729 ENTER 3

#### Example:
Evaluate: \( \frac{2 + 4}{3 + 5} \)
Keystrokes: \((2 + 3) + (4 + 5)\) MATH 1 ENTER \(\frac{22}{15}\)
**Caution:** Use parentheses around each individual fraction

#### Example:
Evaluate: \( \sqrt{5} + \sqrt{125} - \sqrt{2401} \)
Keystrokes: 2nd x^2 9 + MATH 4 125 - 4 MATH 5 2401 ENTER 1

### Storing an Expression

**STO> (black)**: Stores an expression as a designated variable

**Example:**
Store \(1.23456\) as A and then find \(2 + 3A^2\)
Keystrokes: 1.23456 STO> ALPHA MATH ENTER 1.23456
\(2 + 3\) ALPHA MATH x^2 ENTER 6.572415181

### Correcting Errors

- \(<\) & \(>\) (dark blue): Moves the cursor to the left or right one position
- \(\Delta\) & \(\nabla\) (dark blue): Moves the cursor up or down one line within the current expression
- DEL (black): Deletes one or more characters at the cursor position
- 2nd DEL - INS: Inserts one or more characters at the cursor position
- 2nd ENTER - ENTRY: Recalls last expression - can repeat to scroll back to previous entries

**Example:**
Evaluate: \(\frac{2 - 2.3}{\sqrt{4.2}}\)
Keystrokes: \((2 - 2.3) ÷ 2nd x^2 4. 2 ENTER -1.463850109

**Example:**
Evaluate: \( \frac{-2 + 5.3}{\sqrt{4.2}} \)
Keystrokes: 2nd ENTER ÷ (til cursor is on first) 2nd DEL (-) ÷ + 5 ENTER 1.61038512

### Graphing

X.T,θ (black): Variables used in entering equations - X in function mode, θ in polar mode
Y= (black): Accesses screen where you can enter up to 10 equations
**Example:**
Graph: $y = x^2 - 3x - 5$
Keystrokes: Y= CLEAR $x^2$ - 3 $x^0$ - 5 ZOOM 6
TRACE What is y when $x = 0$? $\text{Ans} = 5$
What is y when $x = 1.5$? $\text{Ans} = -7.25$
Practice Zoom In, Zoom Out, and ZBox using the vertex as the focal point.

**Example:**
Set TblMin to -10 and ΔTbl to .25
Keystrokes: 2nd WINDOW CLEAR -10 ▼ CLEAR .25 2nd GRAPH
What is y when $x = -7.25$? $\text{Ans} = 69.313$
Note: To leave the TABLE or TblSet screens, press 2nd MODE.

**Example:**
Gives the y value for the specified x value for function Y,
Finds the root (x-intercept) in a specified interval of a function.
Press 2nd TRACE 2 to select root from the CALC menu. Move the cursor to the left of the x-intercept you are trying to find. Press ENTER. This sets the lower bound which is marked with a ▲ at the top of the window. Move the cursor to the right of the x-intercept you are trying to find. Press ENTER. This sets the upper bound which is marked with a ▼ at the top of the window. Hit ENTER again to accept the Guess. The calculator will display the coordinates of the root.
Very small x values such as 1 E -5 ($1 \times 10^{-5}$) should be rounded to zero.
Note: The lower bound must be to the left of the upper bound or you will receive an ERR:BOUND message.
Gives the relative minimum (lowest point) of a function
Gives the relative maximum (highest point) of a function.
2nd TRACE 5 — intersect
Finds the intersection point of two graphs.
Press 2nd TRACE 5 to select intersection from the CALC menu. The current
graph is displayed and you are prompted to select the First Curve. Use ▲ or ▼
to move the cursor to the first function and press ENTER. Use ▲ or ▼ to move
the cursor to the second function and press ENTER. The coordinates of the point
of intersection are displayed at the bottom of the screen.

**Example:**
Graph: \( y = 2x^3 + 4x^2 - 7x + 3 \)
Keystrokes: \( Y = \text{CLEAR} \ 2\ \text{X} \theta \text{MATH} \ 3 + 4 \ \text{X} \theta \ \text{X}^3 - 7 \ \text{X} \theta \ + 3 \ \text{ZOOM} \ 6 \)
Adjust the viewing rectangle so you can see the whole curve.
(i.e., Under WINDOW, change Ymax to 20.)
Find the leftmost x-intercept using the root function under the CALC menu.
Remember: Lower means left, upper means right. root = (-3.228153, 0)
Find the relative minimum and maximum values using the minimum and
maximum functions under the CALC menu.
maximum = (-1.935961, 17.031756) minimum = (.6026302, .6719474)