Precalculus

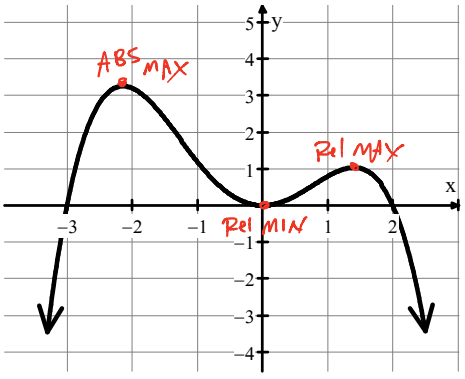
Write your questions and thoughts here!

# 3.2 Extrema & Function Analysis

Name:_____



**Absolute max/min** – *absolutely* the highest or lowest point.



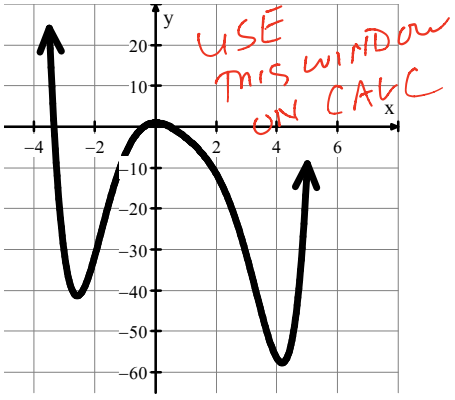

AKA. LOCAL

**Relative max/min** – a point on the function that is higher or lower than all the points immediately surrounding it.

Finding a max/min means finding the y-value of the point. The $x$-value helps you with location of the point, but it is not the max/min value.

1. Find the coordinate points of the extrema of each function and classify its type.

$$f(x) = 0.05x^6 - 0.25x^5 - 0.25x^4 + 2.25x^3 - 5.4x^2 + 1$$



USE THIS WINDOW ON CALC.

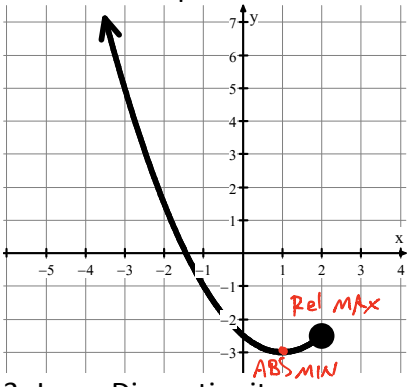
Local MIN @ (-2.583, -41.337)

Local MAX @ (0, 1)

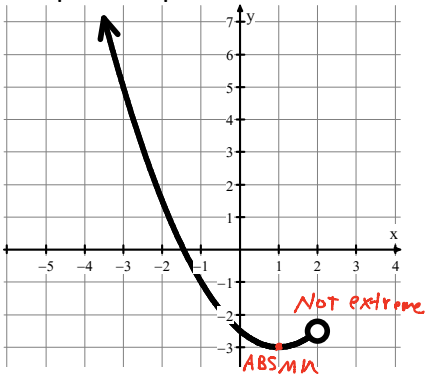
ABS MIN @ (4.168, -57.67)

What is the minimum value of $f$? -57.67

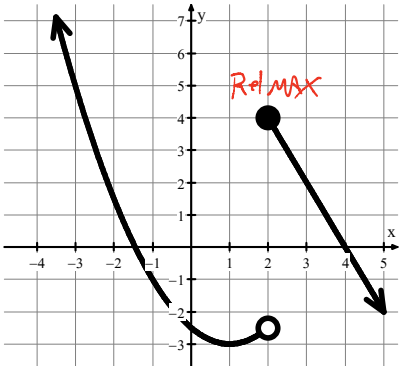
2. Closed Endpoint:




3. Open Endpoint:




3. Jump Discontinuity



# 3.2 Extrema & Function Analysis

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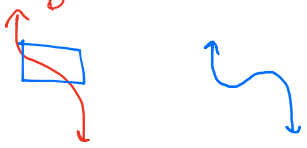
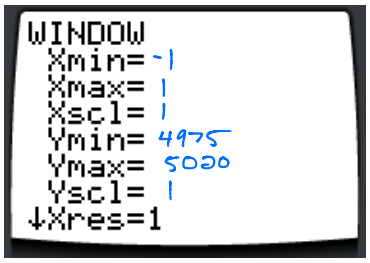
4. Finding a friendly window.

$f(x) = -100x^3 - 45x^2 + 10x + 5000$

Zoom Box



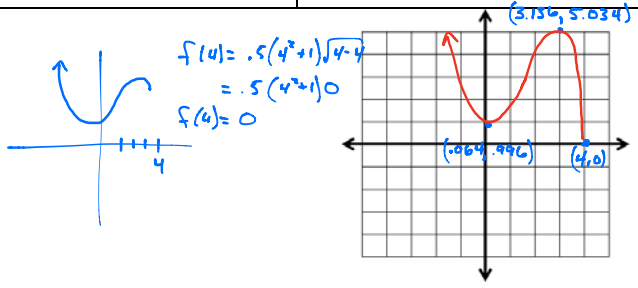



**Function Analysis** – putting it all together!

5. $f(x) = 0.5(x^2 + 1)\sqrt{4 - x}$

| Domain: $(-\infty, 4]$ | Vertical Asymptotes: (*Nonremovable*) | Holes: (*Removable*) |
|---|---|---|
| RADICAND ≥ 0<br>$4 - x \geq 0$<br>$-x \geq -4$<br>$x \leq 4$ | None | None |
| **Absolute max/min value:** | **Local max/min value(s) that are NOT absolute:** | **Increasing:** |
| None | Local MIN of 0.996<br>Local MAX of 5.035 | $(.064, 3.136)$ |
| **Decreasing:** | **Left End-Behavior:** | **Right End-Behavior:** |
| $(-\infty, .064) \cup (3.136, \infty)$ | $\lim_{x \to -\infty} f(x) = \infty$ | $\lim_{x \to \infty} f(x) = -\infty$ |

Sketch a graph:




Now summarize what you learned!

**Skillz Reviews:** Solve or evaluate.

| 1. $\sqrt{-125}$ | 2. $x^2 + 1 = 73$ | 3. $-9(x+7)^2 = -144$ | 4. $5(x-2)^2 = -60$ |
|---|---|---|---|
| $= 5i$ | $x^2 = 72$<br>$x = \pm\sqrt{72}$<br>$x = \pm 6\sqrt{2}$ | $(x+7)^2 = 16$<br>$x + 7 = \pm 4$<br>$x = -11, -3$ | $(x-2)^2 = -12$<br>$x - 2 = \pm\sqrt{-12}$<br>$x = 2 \pm 2i\sqrt{3}$ |