## LEAP FROG: TEACHER CARDS

| If $f(x)$ is increasing, $f^{\prime}(x)$ | If $f^{\prime}(x)$ is positive, $f(x)$ |
| :---: | :---: |
| (is positive) | (is increasing) |
| If $f(x)$ is concave up, $f^{\prime \prime}(x)$ | If $f^{\prime \prime}(x)$ is positive, $f(x)$ |
| (is positive) | (is concave up) |
| If $f^{\prime}(x)$ changes from + to at its only zero, $f(x)$ | If $f^{\prime}(x)$ changes from - to + at its only zero, $f(x)$ |
| (has an absolute maximum) | (has an absolute minimum) |
| If $f(x)$ has relative extrema, $f^{\prime}(x)$ | If $f$ " $(x)$ changes signs, $f(x)$ |
| (equals zero) | (has a point of inflection) |
| If $f^{\prime \prime}(x)$ changes signs, $f^{\prime}(x)$ | If $f^{\prime}(x)$ is continuous, but not differentiable, $f^{\prime}(x)$ |
|  | (has a vertical tangent) |
| If $f(x)$ has a relative maximum, $f$ " $(x)$ | If $f(x)$ has a relative minimum, $f^{\prime \prime}(x)$ |
| (is negative) | (is positive) |
| If $f^{\prime}(x)$ has a relative minimum, $f^{\prime \prime}(x)$ | If $f^{\prime \prime}(x)$ changes from - to,$+ f^{\prime}(x)$ |
|  | (has a relative minimum) |


| If $f^{\prime}(x)$ changes from + to,$- f(x)$ $\qquad$ <br> (has a relative maximum) | If $f(x)$ has a relative maximum, $f^{\prime}(x)$ $\qquad$ $\overline{\text { (changes from }+ \text { to }- \text { ) }}$ |
| :---: | :---: |
| If $f^{\prime}(x)$ is decreasing, $f^{\prime \prime}(x)$ $\qquad$ <br> (is negative) | $\text { If } f^{\prime \prime}(x) \text { is negative, } f^{\prime}(x)$ |
| $\text { If } f^{\prime}(x) \text { is negative, } f(x)$ | If $f(x)$ is decreasing, $f^{\prime}(x)$ $\qquad$ <br> (is negative) |
| If $f^{\prime}(x)$ is increasing, $f^{\prime \prime}(x)$ $\qquad$ <br> (is positive) | If $f^{\prime \prime}(x)$ is positive, $f^{\prime}(x)$ <br> (is increasing) |
| If $f^{\prime}(x)$ changes from - to,$+ f(x)$ $\overline{\text { (has a relative minimum) }}$ | If $f(x)$ has a relative minimum, $f^{\prime}(x)$ $\qquad$ $\overline{\text { (changes from }- \text { to }+ \text { ) }}$ |
| If $f^{\prime}(x)$ has a relative maximum, $f^{\prime \prime}(x)$ $\overline{\text { (changes from }+ \text { to }-)}$ | If $f^{\prime \prime}(x)$ changes from + to,$- f^{\prime}(x)$ $\qquad$ |
| If $f(x)$ is concave down, $f^{\prime \prime}(x)$ $\qquad$ <br> (is negative) | If $\frac{f "(x) \text { is negative, } f(x)}{\text { (is concave down) }}$ |

