Calc Medic AP Precalculus Ultimate Justification Guide

To justify that…	State/show that…
f is best modeled by a linear function	Over consecutive equal-length input-value intervals of size ___, there is a constant difference in output values of ____.
f is best modeled by a quadratic function	Over consecutive equal-length input-value intervals of size ____, there is a constant second difference in output values of ____.
f is best modeled by an exponential function	Input values change additively (in intervals of size ____) as output values change proportionally (by a factor of ___).
f is best modeled by a logarithmic function	Input values change proportionally (by a factor of ___) as output values change additively (in intervals of size ____).
A function f is invertible	Each output value of f is mapped from a unique input value. There are no repeated $f(x)$ values.
The estimated output value found by using a known output and the average rate of change is an overestimate	Secant line is above the curve at the input value of the estimate (Sketch a picture)
The estimated output value found by using a known output and the average rate of change is an underestimate	Secant line is below the curve at the input value of the estimate (Sketch a picture)
f is positive	The graph of f is above the x/t-axis
f is negative	The graph of f is below the x/t-axis
f is increasing	The graph of f has a positive slope
f is decreasing	The graph of f has a negative slope
The rate of change of f is increasing	f is concave up
The rate of change of f is decreasing	f is concave down

f is concave up	Average rates of change of f over equal-sized intervals are increasing
f is concave down	Average rates of change of f over equal-sized intervals are decreasing
The graph of f has a hole at $x = a$	The multiplicity of $x = a$ in the numerator is greater than or equal to the multiplicity of $x = a$ in the denominator
The graph of f has a vertical asymptote at $x = a$	$x = a$ is a zero of the denominator and NOT of the numerator OR The multiplicity of $x = a$ in the denominator is greater than the multiplicity of $x = a$ in the numerator
The graph of f has an x-intercept at $x = a$	$x = a$ is a zero of the numerator and NOT of the denominator
f has a relative maximum at $x = a$	f changes from increasing to decreasing at $x = a$ OR The rate of change of f changes from positive to negative at $x = a$
f has a relative minimum at $x = a$	f changes from decreasing to increasing at $x = a$ OR The rate of change of f changes from negative to positive at $x = a$
A model is considered appropriate for a data set.	The residual plot for the model appears without pattern
The value predicted by the model at a certain input gives an overestimate for the true value at that input	The residual for that input is negative
The value predicted by the model at a certain input gives an underestimate for the true value at that input	The residual for that input is positive
The distance between a point on the graph of $r = f(\theta)$ and the origin is increasing	Values of r are positive and increasing or values of r are negative and decreasing. ($\lvert r \rvert$ is increasing)
The distance between a point on the graph of $r = f(\theta)$ and the origin is decreasing	Values of r are positive and decreasing or values of r are negative and increasing. ($\lvert r \rvert$ is decreasing)