

Things forgotten, or never learned, “nice to know” before calculus, Accel or Accel-like material...

Let’s call a point on a graph where the graph changes from increasing to decreasing, or from decreasing to increasing,... let’s call it a “turning point.” In calculus this will be one kind of “critical point”, but we won’t go there except to mention that fact in advance of next year.

1. For a non-constant *polynomial* $P(x)$, we know the choices for $\lim_{x \rightarrow \pm\infty} P(x)$ can only be ... ? (you supply the answers.)
2. With $\deg(P(x))$ meaning the degree of the polynomial $P(x)$, give an example, if possible, of a polynomial $P(x)$ with $\deg(P(x)) = 4$ that has...
 - (a) 4 turning points:
 - (b) 3 turning points:
 - (c) 2 turning points:
 - (d) 1 turning point:
 - (e) 0 turning points:
 - (f) 3 turning points AND 4 x-intercepts:
 - (g) 3 turning points AND no x-intercepts:
3. Try the problem above for a polynomial $Q(x)$ with $\deg(Q(x)) = 5$.
4. Consider a polynomial $f(x) = (x - a)(x - b)(x - c)^n(x - d)$ where $a < b < c_1 < c < c_2 < d$ with n an even positive integer. What happens to the sign of $f(x)$ as x increases from c_1 to c_2 ? What are the possibilities? What changes, if anything if n is an odd positive integer?
5. What happens to $\lim_{x \rightarrow c} g(x)$ if $g(x) = \frac{1}{f(x)}$ where $f(x)$ is as in the previous problem and...
 - (a) n is an odd positive integer...
 - (b) n is an even positive integer...