WHO LIKES HOMEWORK

Question of the Day

Problem: Calculate at what values of x exists relative maxima and/or minima for the function $x^3 - 3x^2 - 14x + 5 = 0$

Solution:
To find the extremes of the function, the critical points must first be found. To find these, set the derivative equal to zero and solve

$$\frac{d}{dx} x^3 - 3x^2 - 14x + 5 = 0$$
$$3x^2 - 6x \ \ -14 = 0$$

Using the Quadratic formula, we can solve for $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$, where a=3, b=-6, c=-14

$x = \frac{6 \pm \sqrt{6^2 - 4 \cdot 3 \cdot (-14)}}{2 \cdot 3}$ => $x = \frac{3 \pm \sqrt{51}}{3}$ =3.3805 or -1.3805

To find the extrema, plug in the critical points into the second derivative. If it is positive, the graph is concave up and thus the critical point is a minima. If negative, the graph is concave down and thus a max

$$\frac{d}{dx} 3x^2 - 6x \ \ -14$$
$$6x \ \ -6$$

Thus $6(3.3805) - 6 = 14.283$ which implies that at x=3.3805 there is a minimum

Doing the same thing for x=-1.3805, $6(-1.3805) - 6 = -14.283$ which implies that at x=-1.3805 there is a maximum

At x = 3.3805 there is a relative minimum. At x=-1.3805 there is a relative maximum