Quiz # 4

Math 101-Section **01** Calculus I

2 March, 2018, Friday

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Solution Key

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Q-1)

(i) Find a linearization of $f(x) = \sqrt{25 - x^2}$ at $x = 4$, and using that approximate $f(4.01)$.

(ii) Find the absolute min/max of $f(x) = 2x^3 - 9x^2 + 12x$ on $[0, 3]$.

Answer:

(i)

$L(x) = f'(4)(x - 4) + f(4)$

$f'(x) = -x/\sqrt{25 - x^2}$, $f'(4) = -4/3$, $f(4) = 3$ Hence

$L(x) = -\frac{4}{3}(x - 4) + 3 = \frac{25 - 4x}{3}$. And finally

$L(4.01) = \frac{9 - 0.04}{3} = \frac{900 - 4}{300} = \frac{896}{300} \approx 2.9866$. *(Actual value is $f(4.01) = 2.986620163...$)*

(ii)

$f'(x) = 6x^2 - 18x + 12 = 6(x - 1)(x - 2) = 0$, so the critical points are $x = 1$ and $x = 2$.

The end points are $x = 0$ and $x = 3$.

We evaluate the function at these points.

$$f(0) = 0, \quad f(1) = 5, \quad f(2) = 4 \quad f(3) = 9.$$

Hence the absolute minimum is 0 and the absolute maximum is 9.

Here is the graph