>

MAPLE Assignment #3 -- SOLUTIONS

#1(a)

> $f := x \rightarrow (25 - x^2)^{\left(\frac{1}{3}\right)}$

$$f := x \rightarrow (25 - x^2)^{(1/3)}$$

> $g := x \rightarrow D(f)(x)$

$$g := x \rightarrow (\mathrm{D}(f))(x)$$

> $eval(g(x))$

$$-\frac{2}{3}\frac{x}{(25 - x^2)^{(2/3)}}$$

> $L := x \rightarrow f(3)$
> $+ \ g(3) \cdot (x - 3)$

$$L := x \rightarrow f(3) + g(3)\ (x - 3)$$

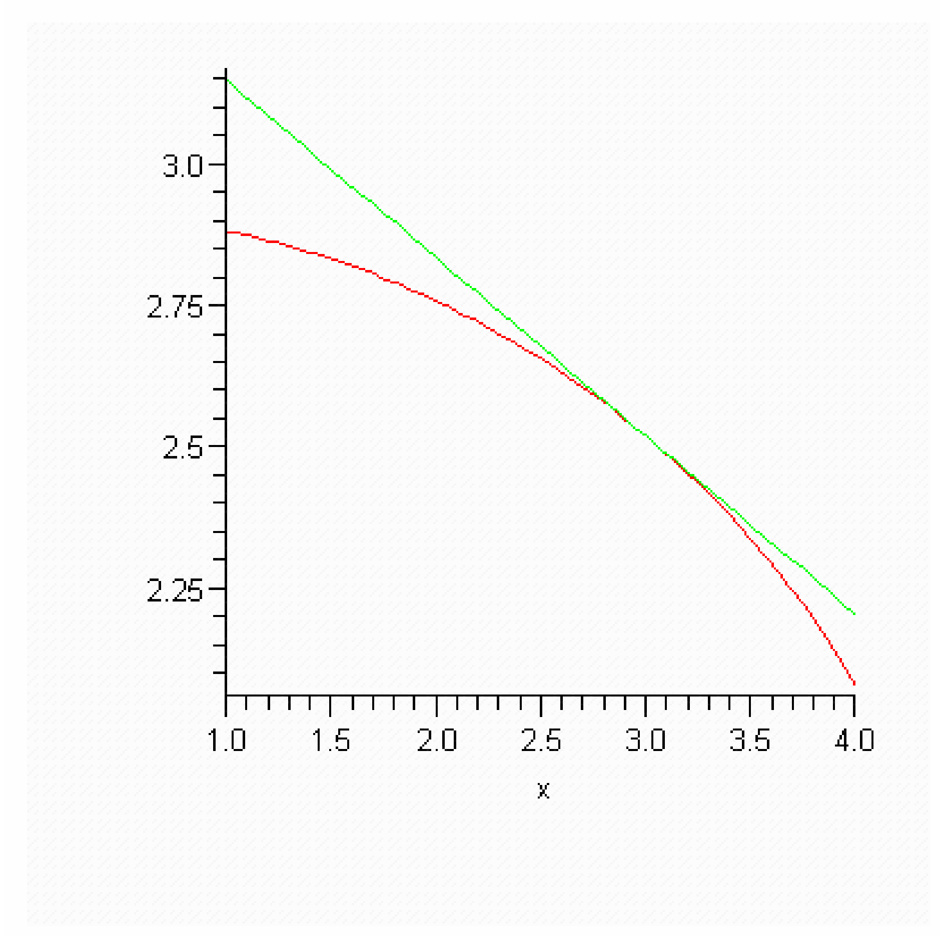
> $eval(L(x))$

$$16^{(1/3)} - \frac{1}{8}\,16^{(1/3)}\ (x - 3)$$

>

#1(b)

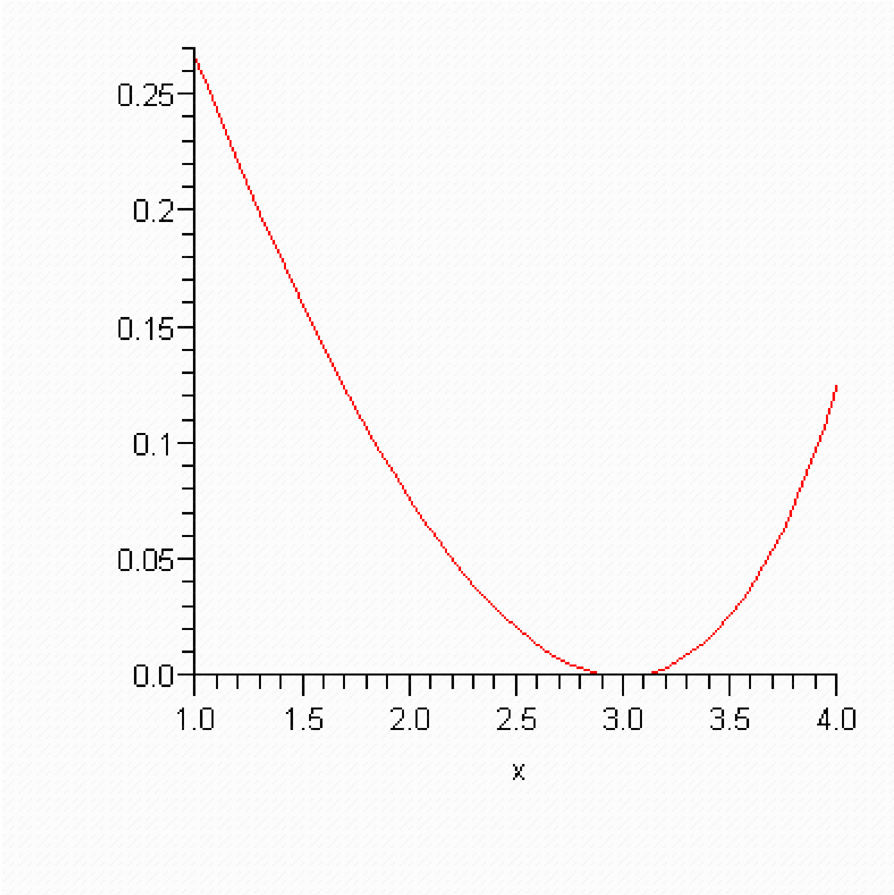
> $plot([f(x), L(x)], x = 1..4)$



>

#1(c)

> $plot(|f(x) - L(x)|, x = 1..4)$



>

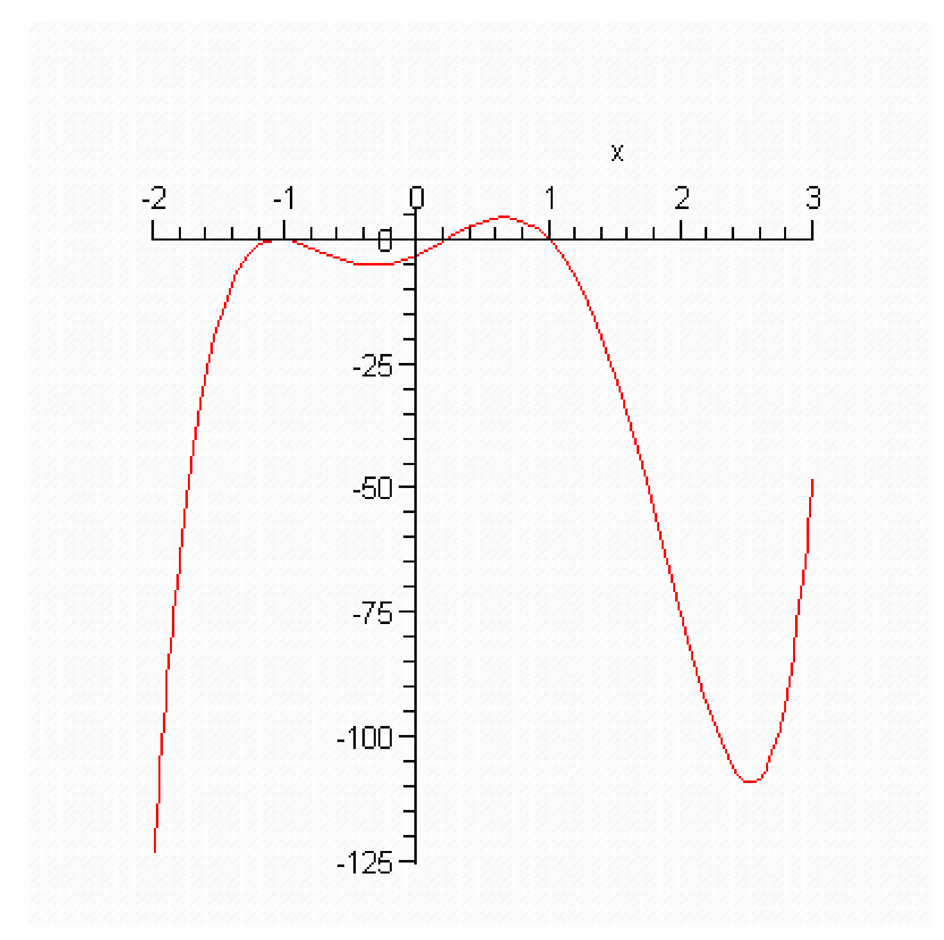
It appears from this graph that if x is in the range [2.0,4.0], this will guarantee that
|f(x)-L(x)|<0.1.

#2(a)

> $f := x \rightarrow 4 \cdot x^5 - 9 \cdot x^4 - 16 \cdot x^3 + 12 \cdot x^2 + 12 \cdot x - 3$

$$f := x \rightarrow 4\, x^5 - 9\, x^4 - 16\, x^3 + 12\, x^2 + 12\, x - 3$$

> $plot(f(x), x = -2 .. 3)$



>

Local maxima appear to be located approximately at x=-1, .6, and local minima at x=-.25 and x=2.5.

#2(b)

> $g := x \rightarrow D(f)(x)$

$$g := x \rightarrow (\mathrm{D}(f))(x)$$

> $eval(g(x))$

$$20\,x^4 - 36\,x^3 - 48\,x^2 + 24\,x + 12$$

> $fsolve(g(x) = 0)$

$-1.051552693, -.3393516909, 0.6658980048, 2.525006379$

>

Local maximum values:

> $f(-1.051552693)$

0
.10742272

> $f(0.6658980048)$

4
.341582762

>

Local minimum values:

> $f(-.3393516909)$

−
5.202389029

> $f(2.525006379)$

−
109.0542964

>

For absolute max and min values also include endpoints.

> $f(-2)$

$$-123$$

> $f(3)$

$$-48$$

>

Therefore the absolute maximum value of f(x) on [-2,3] is about 4.34 which occurs at about x=-.67.

The absolute minimum value of f(x) on [-2,3] is -123 which occurs at x=-2.