

MATH7501 Some Problems for Assignment (5)

Differentiate the following functions:

(a) $f(x) = 3x^4 - 16x^3 + 18x^2$,

(b) $f(x) = x^3 - 9x^2 + 30x$,

(c) $f(x) = x^4 - 2x^3 - 2x^2$,

(d) $f(x) = x^5$,

(e) $f(x) = x^4 + x^3$,

(f) $f(x) = \cos(x) + x$,

(g) $f(x) = \sin(2x) - x$,

(h) $f(x) = \log(x) - x^3$,

(i) $f(x) = 2^x - x$,

Find the general solution to the following ODEs:

(j) $\frac{dy}{dx} = 2x^3 - x$,

(k) $\frac{dy}{dx} = \sin(x) - 12x$.

Solve the following initial value problems:

(l) $\frac{dy}{dx} = x^2 + 3$, $y(0) = -2$,

(m) $\frac{dy}{dx} = x + 2\cos(x)$, $y(0) = 3$.

Locate and classify the local and global maxima and minima for the following functions $f(x)$ and domains D :

(n) $f(x) = 3x^4 - 16x^3 + 18x^2$, $D = [-1, 4]$,

(o) $f(x) = x^3 - 9x^2 + 30x$, $D = [-4, 6]$,

(p) $f(x) = x^4 - 2x^3 - 2x^2$, $D = [-1, 3]$,

(q) $f(x) = x^5$, $D = [-2, 2]$,

(r) $f(x) = x^4 + x^3$, $D = [-3, 3]$,

(s) $f(x) = \cos(x) + x$, $D = [-2\pi, 2\pi]$,

(t) $f(x) = \sin(2x) - x$, $D = [-2\pi, 2\pi]$,

(u) $f(x) = \log(x) - x^3$, $D = [0, 3\pi]$,

(v) $f(x) = 2^x - x$, $D = [-5, 5\pi]$.