WORKSHEET 11

ADRIAN PĂCURAR

Problem 1. Using Newton's Method and starting with $x_1 = 2$, what is the second order approximation x_2 to the root of the equation $x^2 - 1 + 2\sin\left(\frac{\pi}{2}x\right)$?

Problem 2. In an attempt to solve the equation $2 + 4\sin x = \cos x$ by Newton's method, we begin with $x_1 = \frac{\pi}{2}$. Find the value of x_2 in this process.

Problem 3. Suppose $f(a) = 0$ (so a is a root/zero of f). What happens if we try to apply Newton's method with initial value $x_1 = a$?

Problem 4. Find the slant asymptotes of the following functions:

a) $f(x) = \dfrac{x^2 + 4}{x}$

b) $f(x) = \dfrac{2x^3 + x^2 + 1}{x^2 + 2}$

Problem 5. Compute the general antiderivative $F(x)$ for the following functions:

a) $f(x) = 4x^3$

b) $f(x) = x^3$

c) $f(x) = e^x$

d) $f(x) = e$

e) $f(x) = \frac{3}{2}x^{1/2}$

f) $f(x) = \frac{1}{2\sqrt{x}}$

g) $f(x) = x^{-1/2}$

h) $f(x) = 4x^2 + 2$

i) $f(x) = 7x^{2/5} + 8x^{-4/5}$

j) $f(x) = \frac{x^{-1/5}}{x^{4/5}}$

k) $f(x) = \frac{7x^{2/5} + 8x^{-4/5}}{x^{1/5}}$

Problem 6. Compute the general antiderivative $F(x)$ for the following functions:
a) $f(x) = \cos x$

b) $f(x) = \sin x + C$, where C is a constant

c) $f(x) = -\cos x + Cx + D$, where C, D are constants

Problem 7. Find the antiderivative F of f that satisfies the given condition.
a) $f(x) = 5x^4 - 2x^5$, $F(0) = 4$

b) $f(x) = x + 2\sin x$, $F(0) = -6$

Problem 8. Suppose that $f''(x) = 56x^6 + \cos x$. Given that $f'(0) = 5$ and $f(0) = 0$, find the explicit formula for $f(x)$.