

Calculus

Chapter 7: Differential Equations and More Riemann Sums

Lesson 3: Linearization and Newton's Method

Question #1

Reference Q.697

Find the local linear approximation of $f(x) = \sin 2x$ at $x = \pi$.

Question #2

Reference Q.698

- Find the local linear approximation of the function $f(x) = \sqrt{x-1}$ at $x = 2$.
- Use it to approximate $f(1.8)$
- What is the percent error of this approximation?

Question #3

Reference Q.699

- Find the local linear approximation of the function $f(x) = \frac{1}{x+2}$ at $x = 2$.
- Use it to approximate $f(2.1)$
- What is the percent error of this approximation?

Question #8

Reference Q.9274

Given $f(2) = 1$, $f'(2) = 5$, and $f''(2) = 2$, what is the approximation of $f(0.9)$ using a linearization at $x = 2$?

Question #9

Reference Q.9276

Given the differential equation $\frac{dy}{dx} = y^2x + x + y$ and the fact that $y(0) = 1$, approximate $y(0.5)$.

Question #4

Reference Q.700

Solve $x^3 - 7 = 0$ (to at least 4 dec. places) using Newton's method. Label four columns: x_n , $f(x_n)$, $f'(x_n)$, and $x_n - \frac{f(x_n)}{f'(x_n)}$.

Question #5

Reference Q.701

Solve $x^2 - 3 = 0$ (to at least 4 dec. places) for the solution that is positive ($x > 0$) using Newton's method. Label four columns: x_n , $f(x_n)$, $f'(x_n)$, and $x_n - \frac{f(x_n)}{f'(x_n)}$.

Question #6

Reference Q.702

Solve $x^5 - x^4 - 16 = 0$ (to at least 4 dec. places) using Newton's Method (there's only one solution).

Question #7

Reference Q.703

Solve $x^3 - 3x - 18 = 0$ (to at least 4 dec. places) using Newton's Method (there's only one solution).

Question #10

Reference Q.9277

Let $f(x) = x^2 + 2x$; the tangent line at $x = -2$ is used to approximate values on the curve $f(x)$. For which values of x will the error be less than 10%?