FALL 2019 QUIZ 6

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The problems that follow illustrate the methods covered in class. They are typical of the types of problems that will be on the tests.

Problem 1. What is the set $\{A_0, A_1, A_2, A_3, A_4\}$ to estimate $\frac{df}{dx}$ at $x = a$ using the following formula:

$$\frac{df}{dx}\bigg|_{x=a} \approx A_0 \cdot f(a - 2h) + A_1 \cdot f(a - h) + A_2 \cdot f(a) + A_3 \cdot f(a + h) + A_4 \cdot f(a + 2h)$$

Problem 2. Use the above formula to approximate the derivative of $\tan(x)$ at $x = 2$.

Problem 3. What is the set $\{A_0, A_1, A_2, A_3, A_4\}$ to estimate $\frac{d^2 f}{dx^2}$ at $x = a$ using the following formula:

$$\frac{d^2 f}{dx^2}\bigg|_{x=a} \approx A_0 \cdot f(a - 2h) + A_1 \cdot f(a - h) + A_2 \cdot f(a) + A_3 \cdot f(a + h) + A_4 \cdot f(a + 2h)$$

Problem 4. Use the above formula to approximate the second derivative of $\tan(x)$ at $x = 2$.

Problem 5. What is the error in the estimate in problems 2 and 4? What is the error estimate in terms of $K \cdot h^k$ for what k?