Linear and Quadratic Approximation Assignment

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Linear and Quadratic Approximation Assignment

Question 0

Watch the lecture video here.

Did you watch the video? [Type yes or no.]

Question 1

Use linear approximation to estimate the following and give the percent error:

Part a

$67^{4/3}$

[Note: $64^{4/3} = \left(\sqrt[3]{64}\right)^4 = 4^4 = 256$, so use $x = 64$ for your point of tangency.]

1

Part b

$66^{4/3}$ [Use the same tangent line as part a.]

Is the percent error bigger or smaller than Part a? Why?

2

Part c

$\cos\left(\frac{\pi}{7}\right)$

[Note: $\frac{\pi}{6}$ is close to $\frac{\pi}{7}$, and $\cos\left(\frac{\pi}{6}\right) = \frac{\sqrt{3}}{2}$, so use $x = \frac{\pi}{6}$ for your point of tangency.]

Question 2

Consider a function f such that $f(5) = 10$ and $f'(5) = -3$. Estimate $f(6)$ using a tangent line.

[Hint: Since I have not given you a formula for $f(x)$, you can't copy and paste the linear approximation code from the notes. Instead, use the tangent line formula and plug in the given numbers.]

Question 3

Use quadratic approximation to estimate $67^{4/3}$ and find the percent error (use the same point of tangency as Question 1). Compare with your result for Question 1, Part a.

Question 4

Use quadratic approximation to estimate $\cos\left(\frac{\pi}{7}\right)$ and find the percent error (use the same point of tangency as Question 1). Compare with your result for Question 1, Part c.