

4. [13 points] Let $f(x) = e^{\sin \sqrt{x}}$. Let P be the point on the graph of f at which $x = 4\pi^2 (\approx 39.4784)$.

a. [3 points] Calculate $f'(x)$.

b. [4 points] Find an **exact** formula for the tangent line $L(x)$ to $f(x)$ at P . **Exact** means your answer should not involve any decimal approximations.

c. [2 points] Use your formula for $L(x)$ to approximate $e^{\sin \sqrt{38}}$.

d. [4 points] Recall that the error, $E(x)$, is the actual value of the function minus the value approximated by the tangent line. Given the fact that in this case $E(39) \approx 0.000613$ and $E(40) \approx 0.000719$, would you expect $f''(4\pi^2)$ to be positive or negative? Explain, without doing any calculations.