Principles of Calculus Modeling: An Interactive Approach by Donald Kreider, Dwight Lahr, and Susan Diesel
Exercises for Section 2.14

1. (1 pt)
Find the linearization of the function $3x^2+3x$ at the point where $x=-1$.
$L(x) =$ ____________

2. (1 pt)
Find the linearization of the function $\sqrt{-4-x}$ at the point where $x=-5$.
$L(x) =$ ____________

3. (1 pt)
Find the linearization of the function $\cos(x)$ at the point where $x=-0.25\pi$.
$L(x) =$ ____________

4. (1 pt)
Find the linearization of the function $\cos^2(x)$ at the point where $x=\frac{7}{6}\pi$.
$L(x) =$ ____________

5. (1 pt)
Use a suitable linearization to approximate $\sqrt{83}$.
Linear approximation of $\sqrt{x}$:
$L(x) =$ ____________
$\sqrt{83} \approx$ ____________

6. (1 pt)
Use a suitable linearization to approximate $\sqrt[4]{259}$.
Linear approximation of $\sqrt[4]{x}$:
$L(x) =$ ____________
$\sqrt[4]{259} \approx$ ____________

7. (1 pt)
Use a suitable linearization to approximate $\cos\left(\frac{13}{60}\pi\right)$.
Linear approximation of $\cos(x)$:
$L(x) =$ ____________
$\cos\left(\frac{13}{60}\pi\right) \approx$ ____________

8. (1 pt)
In this problem you will compare two methods of estimating a square root. When you use linear approximation to approximate $\sqrt{65}$, you consider the equation $f(x)=\sqrt{x}$ and work with the tangent line to the graph of $y=f(x)$ at (64,8). If you use Newton's Method, you consider $g(x)=x^2-65$ and look for a root of this equation.
Find a linear approximation to $f(x)$, starting at (64,8) to get an approximation for $\sqrt{65}$.
$\sqrt{65} \approx$ ____________
Perform one iteration of Newton's Method for $g(x)$ starting at $x_0=8$.
$\sqrt{65} \approx$ ____________

9. (1 pt)
Find the linearization of the function $-2x^3+10\sin x$ at the point where $x=\pi$.
$L(x) =$ ____________

10. (1 pt)
Find the linearization of the function $f(x)=e^x$ at the point where $x=5$.
$L(x) =$ ____________