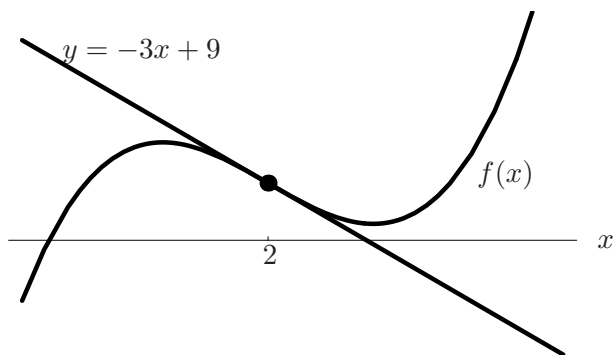**1.** (3+3+3+3 points) The figure below shows the tangent line approximation of $f(x)$ near $x = a$.

(a) What are a, $f(a)$, and $f'(a)$?

$$a = \underline{\quad 2 \quad} \qquad f(a) = \underline{\quad 3 \quad} \qquad f'(a) = \underline{\quad -3 \quad}$$

(b) Estimate $f(2.1)$. Is this an overestimate or an underestimate? Why?

$f(2.1) \approx \underline{\ 2.7\ }$ is an $\underline{\ \text{underestimate}\ }$ because the tangent line approximation of $f(x)$ for $x > 2$ lies below the graph of $f(x)$.

(c) Estimate $f(1.98)$. Is this an overestimate or an underestimate? Why?

$f(1.98) \approx \underline{\ 3.06\ }$ is an $\underline{\ \text{overestimate}\ }$ because the tangent line approximation of $f(x)$ lies above the graph of $f(x)$ for $x < 2$.

(d) Would you expect your estimation for $f(2.1)$ or $f(1.98)$ to be more accurate? Why?

The tangent line approximation is increasingly more accurate the closer one gets to $x = 2$. Since $2.1 - 2 = 0.1$ and $2 - 1.98 = 0.02$, we would expect $f(1.98)$ to be more accurate.