

Classroom Voting Questions: Calculus I

3.9 Linear Approximation and the Derivative

1. If $e^{0.5}$ is approximated by using the tangent line to the graph of $f(x) = e^x$ at $(0,1)$, and we know $f'(0) = 1$, the approximation is
 - (a) 0.5
 - (b) $1 + e^{0.5}$
 - (c) $1 + 0.5$
2. The line tangent to the graph of $f(x) = \sin x$ at $(0,0)$ is $y = x$. This implies that
 - (a) $\sin(0.0005) \approx 0.0005$
 - (b) The line $y = x$ touches the graph of $f(x) = \sin x$ at exactly one point, $(0,0)$.
 - (c) $y = x$ is the best straight line approximation to the graph of f for all x .
3. The line $y = 1$ is tangent to the graph of $f(x) = \cos x$ at $(0,1)$. This means that
 - (a) the only x -values for which $y = 1$ is a good estimate for $y = \cos x$ are those that are close enough to 0.
 - (b) tangent lines can intersect the graph of f infinitely many times.
 - (c) the farther x is from 0, the worse the linear approximation is.
 - (d) All of the above
4. Suppose that $f''(x) < 0$ for x near a point a . Then the linearization of f at a is
 - (a) an over approximation
 - (b) an under approximation
 - (c) unknown without more information.
5. Peeling an orange changes its volume V . What does ΔV represent?
 - (a) the volume of the rind
 - (b) the surface area of the orange
 - (c) the volume of the “edible part” of the orange

- (d) $-1 \times$ (the volume of the rind)
6. You wish to approximate $\sqrt{9.3}$. You know the equation of the line tangent to the graph of $f(x) = \sqrt{x}$ where $x = 9$. What value do you put into the tangent line equation to approximate $\sqrt{9.3}$?
- (a) $\sqrt{9.3}$
 - (b) 9
 - (c) 9.3
 - (d) 0.3
7. We can use a tangent line approximation to \sqrt{x} to approximate square roots of numbers. If we do that for each of the square roots below, for which one would we get the smallest error?
- (a) $\sqrt{4.2}$
 - (b) $\sqrt{4.5}$
 - (c) $\sqrt{9.2}$
 - (d) $\sqrt{9.5}$
 - (e) $\sqrt{16.2}$
 - (f) $\sqrt{16.5}$