AP Calculus

Name _____

Date _____

LINEAR APPROXIMATIONS PRACTICE

1. A. Find the linearization of $f(x) = x^{100}$ near $x = 1$.
   B. Use the linearization to approximate f(1.002).

2. A. Find the linearization of $f(x) = \sqrt{x}$ near $x = 25$.
   B. Use the linearization to approximate the value of $\sqrt{24}$.

3. A. Find the linearization of $f(x) = x^2$ near $x = 1$.
   B. Use the linearization to approximate the value of $f(.99)$.

4. A. Find the linearization of $f(x) = \sqrt[3]{1+x}$ near $x = 0$
   B. Use the linearization to approximate $f(0.3)$.

5. (MC) What is the local linear approximation of $f(x) = \dfrac{x^2}{x^3+1}$ for x near 2?

A. $-\frac{8}{81}x+\frac{52}{81}$ B. $-\frac{12}{81}x+\frac{4}{9}$ C. $\frac{12}{81}x+\frac{60}{81}$ D. $-\frac{12}{81}x+\frac{60}{81}$ E. $-\frac{1}{3}x+2$

6. Find an equation of the tangent line that can be employed to approximate the value of $f(x) = \sqrt{x+8}$ near $x = a$.

7. Use the linear approximation of $g(x) = \dfrac{1}{2+\sin(x)}$ at $x = 0$ to estimate the value of $g\left(-\frac{1}{10}\right)$.

8. (MC) If $g(-2) = 6$ and $g'(-2) = -3$, then what is an approximate value of $g(-1.97)$?

A. 5.99 B. 6.09 C. -5.91 D. 6.01 E. 5.91

9. (MC) Function f is a differentiable function, where $f(-2) = 1$ and $f'(-2) = 5$. If the tangent line to the graph of function f at $x = -2$ is used to approximate the value of the zero of function f, then that approximation is

A. -2.4 B. -0.1 C. -2.2 D. -2.6 E. -0.3

10. (MC) The local linear approximation of a function f will always be greater than or equal to the function's value if, for all x in an interval containing the point of tangency,

(HINT: Think graphically . . . what are you finding graphically when you consider $f'(x)$? What are you finding graphically with you consider $f''(x)$?)

A. $f'(x) < 0$
B. $f'(x) > 0$
C. $f''(x) < 0$
D. $f''(x) > 0$
E. $f'(x) = f''(x) = 0$

11. For all values of x in the interval containing the point of tangency, if the local linearization of the function f is always less than or equal to the values of the function, then which of the following is true?

A. $f'(x) < 0$
B. $f'(x) > 0$
C. $f''(x) = 0$
D. $f''(x) > 0$
E. $f''(x) < 0$

12. (You may use your calculator for this question to "number crunch" after you have completed the set up.)

If $h(x) = 5^x$ and $5^{2.08} = 28.435$, which of the following values *best* approximates $h'(2)$?

A. 429.4 B. 3.435 C. 42.94 D. 34.35 E. 4.29