

## Tangent Line Approximation Worksheet

1) Given  $f(-3) = 4$  and  $f'(-3) = 2$ , which of the following is the tangent line approximation of  $f(-3.1)$ ?

- A) 3.8      B) 3.9      C) 4.0      D) 4.1      E) 4.2

2) Let  $f$  be a differentiable function such that  $f(3) = 2$  and  $f'(3) = 5$ . If the tangent line to the graph of  $f$  at  $x = 3$  is used to find an approximation to a zero of  $f$ , that approximation is

- A) 0.4      B) 0.5      C) 2.6      D) 3.4      E) 5.5

3) Given the following data for a function  $f$ .

$x$	1.1	1.3	1.5	1.7	1.9	2.1
$f(x)$	12	15	21	23	24	25

a) Estimate  $f'(1.7)$  using average rate of change.

b) Write an equation for the tangent line to the graph of  $f$  at  $x = 1.7$ .

c) Use your answer in b) to predict the value of  $f$  at  $x = 1.8$ .

4) For the function  $f$ ,  $f'(x) = 2x + 1$  and  $f(1) = 4$ . What is the approximation for  $f(0.8)$  found by using the line tangent to the graph of  $f$  at  $x = 1$ ?

- A) 0.6      B) 3.4      C) 4.2      D) 4.6      E) 4.64

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5) The relation  $x^2y + 2xy^3 = 8$  defines  $y$  as a function of  $x$  near to  $(2, 1)$ . Call this function  $y = f(x)$ . Use the linear tangent approximation to find an approximate value for  $f(1.92)$ .

6) The local linear approximating of a function  $f$  will always be greater than the function's value if, for all  $x$  in the interval containing the point of tangency,

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

7) The solution of the differential equation  $\frac{dy}{dx} = -\frac{x^2}{y}$  contains the points  $(3, -2)$ . Approximate the value of  $y$  when  $x = 2.7$ .

(A) -1.45    (B) -3.35    (C) -0.65    (D) -2.65    (E) -1.85

8)  $\frac{dy}{dx} = \frac{x-y}{2y}$  and  $y = -2$  when  $x = 3$ .

An estimate for the value of  $y$  when  $x = 3.2$  using a linear tangent approximation is:

(A) -2    (B) -2.15    (C) -2.2    (D) -2.25    (E) -2.30

9) Find an approximate value for  $x^3 - 3x^2 + 2x - 1$  when  $x = 1.998$  without the aid of a calculator. Determine if this is an under or an over approximation.