Name:_____ Date:_____

AP Calc AB: Linear Approximations Ms. Loughran

Do Now

1. Given $f(x) = x^3$
   (a) Write an equation for the line tangent to the curve at $x = 1$
   (b) Using the equation in (a) estimate $f(1.1)$.
   (c) Evaluate $f(1.1)$ using your calculator.
   (d) Compare your findings in (b) and (c), what do you notice?

Tangent line approximation:

2.

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Consider the curve defined by $-8x^2 + 5xy + y^3 = -149$.

(a) Find $\frac{dy}{dx}$.

(b) Write an equation for the line tangent to the curve at the point $(4, -1)$.

(c) There is a number k so that the point $(4.2, k)$ is on the curve. Using the tangent line found in part (b), approximate the value of k.

(d) Write an equation that can be solved to find the actual value of k so that the point $(4.2, k)$ is on the curve.

(e) Solve the equation found in part (d) for the value of k.

Classwork

1. Make a table of x and approximate y values for the equation $y^3 - xy = -6$ near $x = 7$, $y = 2$. Your table should include the x values 6.8, 6.9, 7.0, 7.1, and 7.2.

2. Consider the equation $x^3 + y^3 - xy^2 = 5$.
   (a) Find $\frac{dy}{dx}$ by implicit differentiation.
   (b) Give a table of approximate values near $x = 1, y = 2$ for $x = 0.96, 0.98, 1, 1.02, 1.04$.
   (c) Find the y value for $x = 0.96$ by substituting $x = 0.96$ in the equation and solving for y using your calculator. Compare with your answer in part (b).

3. Consider the curve $xe^{5y} = 3y$
   (a) Find $\frac{dy}{dx}$ by implicit differentiation.
   (b) Find the equation of the tangent line to the curve at (0,0).
   (c) If $x = 0.1$, estimate y using the tangent line.