Math 151 - Week-In-Review 9

Topics for the week:

3.10 Linear Approximations and Differentials
4.1 Maximum and Minimum Values

3.10 Linear Approximations and Differentials

1. Write the linearization $L(x)$ of the function $f(x) = \ln(3x + 4)$ at $a = -1$.

2. Write the linearization $L(x)$ of the function $f(x) = \sqrt[5]{x - 32}$ at $a = 0$. Then use $L(x)$ to approximate $\sqrt[5]{-31}$.

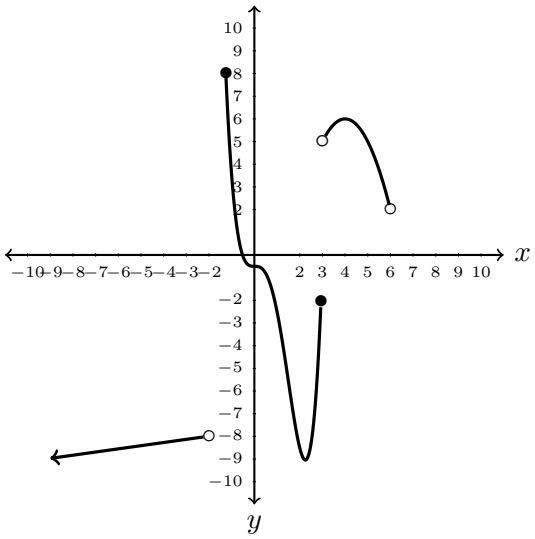
3. Approximate $\sqrt[44]{1.3}$.

4. Find the differential of the function, $y = e^{2x}\sin(3x)$.

5. The radius of a circle increases from an initial value of 10 cm by a change of 0.1 cm. Estimate the corresponding change in the circle's area. Then calculate the relative error and the percentage error in the estimate.

4.1 Maximum and Minimum Values

6. Use the graph of $f(x)$ below to identify any values of x for which the function



(a) has an absolute minimum.

(b) has an absolute maximum.

(c) has a local minimum.

(d) has a local maximum.

(e) has a critical number.

7. Compute any absolute and local extrema for $f(x) = 6x^3 + 9x^2 - 36x + 8$ on the interval $[0, 2]$.

8. Does our answers to the previous question change if we adjust the interval to $(-\infty, \infty)$?

9. Compute any critical numbers and absolute and local extrema for $g(x) = |3x^2 + 9x|$.

10. Compute any critical numbers and absolute and local extrema for $h(x) = \arctan(5x^2)$.

11. Compute any critical numbers and absolute and local extrema for $f(x) = x(x-3)^{-1}$.

12. Compute any absolute extrema for $g(x) = 4\cos^2(2x) + 4x$ on the interval $\left[0, \frac{\pi}{2}\right]$.