

MATH 16100
Exam 3 review class

Note: If work is not shown, no credit will be given. NO CALCULATORS.

1. A boat is pulled into a dock by a rope attached to the bow of the boat and passing through a pulley on the dock that is 1 m higher than the bow of the boat. If the rope is pulled in at a rate of 1 m/s, how fast is the angle between the rope and the water surface changing when the boat is 4 m from the dock?
2. A particle moves along the hyperbola $y^2/2 - x^2 = 1$. As it reaches the point $(-1, 2)$, the y-coordinate is increasing at a rate of 3 in/sec. How fast is the x-coordinate of the point changing at that instant?
3. If $y = f(u) = e^u \cos u$, then what is dy and what is the linear approximation of $f(-0.01)$.
4. If $f'(x) = \cos x \sin x$, and $f(1) = 1$, then what is the linearization of $f(x)$ at $x = 1$.
5. If $y = 3x^4 - 4x^3 - 12x^2 + 2$, find the absolute max and absolute min of $f(x) = y$ on the interval $[-3, 3]$.
6. Find the maximal value of $f(x) = 2\sqrt{2} \sin x + \cos x$ on $[0, \pi]$.
7. If $f(3) = 2$ and $f'(x) \geq 1$ for $3 \leq x \leq 6$, how small can $f(6)$ possibly be? (HW lesson 25 no.7) also try Exam 3 fall 2014 no.5.
8. State the Mean value theorem and Rolle's theorem (explicitly).
9. Compute $\lim_{x \rightarrow \infty} (\ln x)^{1/x}$.
10. Compute $\lim_{x \rightarrow 0} \frac{\sin x}{e^x}$.
11. Find an example that $f'(0) = f''(0) = 0$ but $f(x)$
 - (a) has a local min at $x = 0$.
 - (b) has a local max at $x = 0$.
 - (c) doesn't have a local min nor local max at $x = 0$.
12. What is the First Derivative Test and Second Derivative Test find example to practice.
13. What is inflection points of a function? If I know the x-coordinate of the inflection point, how to find the y-coordinate.
14. Go over the sections on Der. and Shape of Graphs (Lesson 26 27) and Summary of Curve Sketching (Lesson 29), I will find some excise for you on Thursday.