

PRACTICE Test III

MA141-008

10/31/2018 Name: _____

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Read all of the following information before starting the exam:

- Complete each problem. Show all of your work clearly and in order and justify your answers, as partial credit will be given when appropriate and there may be NO credit given for problems without supporting work. **Circle or otherwise indicate your final answers your final answers.** All answers should be completely simplified, unless otherwise stated.

You may not use calculator.

1. Use linear approximation to find $f(a+h)$ for $f(x) = \frac{1}{\cos x}$, $a = \frac{\pi}{4}$ and $h = \frac{\pi}{3}$.

Hint: $\sin \frac{\pi}{4} = \frac{1}{\sqrt{2}} = \cos \frac{\pi}{4}$.

2. A rectangle with base on the x-axis has its upper vertices on the curve $y = 3 - x^2$. Find the maximum area of such a rectangle.

3. Use Newton's method with $x_0 = 1$ to find the root of the equation $x^4 - x^2 = 2$. Show only 2 iterations, i.e. x_1, x_2

4. A ladder 10 feet long is resting against a wall. If the bottom of the ladder is sliding away from the wall at a rate of 1 foot per second, how fast is the top of the ladder moving down when the bottom of the ladder is 8 feet from the wall?

5. Find the following limits or show they do not exist. Show your work in detail.

1. $\lim_{x \rightarrow 0} \frac{(3x - \sin 3x)^n}{x^{3n}} =$

2. $\lim_{x \rightarrow 0} \frac{1}{x} \ln \sqrt{\frac{1+x}{1-x}} =$

6. List all critical points, local/global maximum and minimum points, points of inflection, intervals of increasing/decreasing, and intervals of concavity of $f(x) = x^4 - 2x^3$

Good luck!