

MATH 160. PRACTICE FOR TEST 4.

In problems 1-2, solve for x . Give your answer to two decimal places.

1.

$$e^{x-4} = 21$$

2.

$$\log_3(x - 4) + \log_3(x - 2) = 1$$

3. In 1991 hikers discovered the mummified remains of a man in the Alps in Northern Italy. Samples tested indicated that 53% of the original Carbon-14 remained. Based on this, approximately how long ago did the Iceman die (recall that the half-life of Carbon-14 is 5730 years)?

4. The population of Tennessee was approximately 4.8 mil in 1990. By 99 it had grown to approx 5.5 mil. Assuming an exponential model, what was the annual rate of growth during this period?

5. The largest measured earthquake in the United States was the 1964 Prince Williams Sound earthquake in Alaska. It measured 9.2 on the Richter scale. The largest measured earthquake in the contiguous forty-eight states was in 1812 in New Madrid Missouri, at an estimated 7.9 on the Richter scale. Compare the relative intensities of these two quakes.

6-8. Find $\frac{dy}{dx}$.

6.

$$y = (e^{3x^2} + 1)^2$$

7.

$$y = \ln \left(1 + e^{1+\ln x} \right)$$

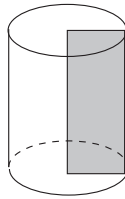
8.

$$y = (1 + 2x)(\ln x)^2$$

9. Find the equation of the tangent line to the curve $\frac{x}{y} + \ln y = 0$ at the point $(0, 1)$.

10. A right triangle has area 10. How long should the legs x and y of the triangle be in order to minimize the length of the hypotenuse?

11. A rectangle of fixed perimeter 36 is rotated about one of its sides, thus sweeping out a figure in the shape of a right circular cylinder. What is the maximum possible volume of that cylinder?



12. A cylindrical canister with an open top has volume 10 ft^3 . Find the dimensions (radius and height) that will minimize the materials necessary to make this canister. Recall that the volume of a cylinder is $V = \pi r^2 h$, the area of the bottom is πr^2 , and the area of the side is $2\pi r h$.