

Calculus Worksheet #5 Unit 10 page 1 _____

Find the equations of the lines that are tangent and normal to the graph of each of the following functions at the point on the graph with the given x-coordinate.

1. $f(x) = \ln(x^2) - 2$; $x = 1$

tangent :

normal:

2. $f(x) = 2e^x + 3x$; $x = 0$

tangent:

normal:

3. $f(x) = \frac{e^x}{\cos x}$; $x = 0$

tangent :

normal:

4. $f(x) = \frac{x + \sin x}{\cos x}$; $x = 0$

tangent:

normal:

Solve the following problems.

5. A rectangle has one side on the x-axis and its upper two vertices on the graph of the function $f(x) = e^{-2x^2}$. What is the maximum area of the rectangle?

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Find the area of the region described in each problem. Round your answers to 3 significant digits.

6. The region is bounded by the x-axis, the lines $x = .5$ and $x = 2$, and the curve $y = 8/x$.

7. The region is bounded by the x-axis, the lines $x = \pi/6$ and $x = \pi/3$, and the curve $y = \tan x$.

8. The region is bounded by the x-axis, the lines $x = 1$ and $x = 3$, and the curve $y = 3e^{-0.5x}$.

9. The region is bounded by the x-axis and the curve $y = \sin x$ from $x = 0$ to $x = \pi$.

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Find the volume of the solid formed when the given region is rotated about the x-axis. Round your answers to 3 significant digits.

10. The region is bounded by the x-axis, the lines $x = .5$ and $x = 2$, and the curve $y = 8/x$.

11. The region is bounded by the x-axis, the lines $x = \pi/6$ and $x = \pi/3$, and the curve $y = \tan x$.

12. The region is bounded by the x-axis, the lines $x = 1$ and $x = 3$, and the curve $y = 3e^{-0.5x}$.

13. The region is bounded by the x-axis and the curve $y = \sin x$ from $x = 0$ to $x = \pi$.

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Find the average value of the given function, $y = f(x)$, over the given interval, $[a, b]$.

14. $f(x) = \sin x$; $[0, \pi/3]$

15. $f(x) = \tan x$; $[0, \pi/3]$

16. $f(x) = 1/x$; $[1, 5]$

17. $f(x) = e^x$; $[0, \ln 2]$

18. $f(x) = 3^x$; $[1, 3]$