

MA161 - Exam 2 - Guide
February 23, 2024
Show your work!

Name: _____

Find $f'(x)$.

1. $f(x) = \frac{5}{\sqrt{x}}$

2. $f(x) = e^2 - e^x + x^e$

3. $f(x) = x^2 \sin x$

4. $f(x) = 4e^{-x} + \cos x - 9 \ln x$

5. $f(x) = (2x^4 - 3e^{2x} + \tan x)^7$

6. (a) Find the slope of the tangent line to the graph of $y = \cos(x)$ at $\left(\frac{\pi}{4}, \frac{\sqrt{2}}{2}\right)$.

(b) Find the slope of the tangent line to the graph of $y = \cos^{-1}(x)$ at $\left(\frac{\sqrt{2}}{2}, \frac{\pi}{4}\right)$.

(c) Show that the answers to (a) and (b) are multiplicative inverses of each other.
(Hint: Show $\frac{1}{(a)} = (b)$ or $(a)(b) = 1$.)

7. $f(x) = \sec^3 x$

8. $f(x) = e^{\sec^3 x}$

9. $f(x) = \frac{x^3}{\cos x}$

10. $f(x) = \sin^{-1}(x^3)$

11. Use derivatives to determine which curve is steeper at $x = 0$, $f(x) = 2^{3x+1}$ or $g(x) = 3^{2x+1}$.

12. $f(x) = \sqrt{x^2 - 1}$

13. $f(x) = \ln(\cos x)$

14. Find the equation of the tangent line to $f(x) = \ln(\cos x)$ at $x = \frac{\pi}{4}$.

15. $f(x) = \csc(2x)$

16. $f(x) = x^{2x}$

17. Find all points (x, y) where the curve $(x - 1)^2 + (y - 1)^2 = 1$ has a horizontal tangent. Bonus: sketch a graph of the curve and its horizontal tangents.