

NAME: _____

MATH 181 QUIZ 2 FALL 2009

This is due Thursday, Oct. 1st. PLEASE SHOW ALL WORK!

1.) (10 pts). Find the equation of a line tangent to $f(x) = \sqrt{1-2x}$ 1. _____
at the point (0, 1). Use the formula $\lim_{\Delta x \rightarrow 0} \frac{f(c + \Delta x) - f(c)}{\Delta x}$.

2.) Find the derivative of $f(x) = -\frac{2}{(1-x)^2}$ by the **limit process**. 2. _____

3.) Find the derivative of $f(x) = \frac{3}{x^5} - \frac{\pi^2}{\sqrt{3}} + 2e^2 x$ 3. _____
Write your answer as a single fraction.

4.) Find the derivative of $h(t) = 3 \cdot \sqrt[3]{t} - \frac{1}{\sqrt[3]{t}}$ 4. _____
Write your answer as a single fraction.

5.) Find the derivative of $g(x) = -\frac{1}{2x^2} - \frac{10}{3x^3} + \frac{6}{x^4} - \ln(2)$

Write your answer as a single fraction and factor.

5. _____

6.) Find the derivative of $f(\theta) = \frac{\tan \theta + \sin \theta}{1 + \cos \theta}$ by first simplifying by using trigonometric identities.

6. _____

7.) Find the derivative of $f(x) = 1 - \frac{\cos^2 x}{1 + \sin x}$ by first simplifying by using trigonometric identities.

7. _____

8.) Find the derivative of $h(\theta) = \frac{1 - \sin \theta}{\cos \theta}$ **without** using the quotient rule.

8. _____

9.) Determine the x-value(s) at which the graph $y = 4x^3 + 21x^2 + 30x - 5$ has a horizontal tangent line.

9. _____

10.) Determine the x-value(s) at which the graph

$$y = \frac{3x^2 - 2x + 27}{x} \text{ has a horizontal tangent line.}$$

10. _____

11.) Find the derivative of $f(x) = (x^2 + 2)(\sqrt{x^3 + 1})$

Use the power rule. Write answer with descending powers.

11. _____

12.) Find the derivative of $f(x) = (\sqrt{x} + \pi)(\sqrt{x} - \pi)$

12. _____

13.) Find the derivative of $g(x) = \frac{3x \cos x}{\sin x - 1}$

Fully factor and simplify your answer.

13. _____

14.) Find the derivative of $f(x) = \sqrt[3]{\frac{x}{4-x}}$

Simplify and write with positive exponents.

14. _____

15.) Find the derivative of $f(x) = \sin\left(6\cos\left(\frac{x}{6}\right)\right)$

15. _____

16.) Find the derivative of $g(x) = 2\sqrt{7 - x\cos(x^2)}$

16. _____

17.) (10 points). Use $x^4 + \sin y = x^3 y^2$ for the following questions:

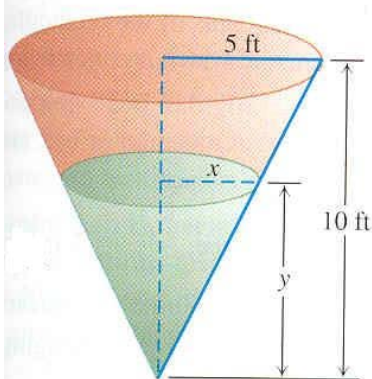
a.) Find $\frac{dy}{dx}$ by implicit differentiation.

17a. _____

b.) Use your answer in part a to find the equation of the tangent line at the point $(0, 0)$.

17b. _____

18.) A tank of water in the shape of a cone is leaking water at a constant rate of $9 \text{ ft}^3 / \text{min}$. The base radius of the tank is 5 ft and the height of the tank is 10 ft. At what rate is the depth of the water in the tank changing when the depth of the water is 6 ft? Use $V = \frac{1}{3} \cdot \pi \cdot x^2 \cdot y$. Hint: you will need to use similar triangles.



18. _____