

Do not write in the boxes immediately below.

Question:	1	2	3	4	5	6	Total
Points:	46	15	15	15	4	5	100
Score:							

MATH 2250 Exam 2

March 19, 2009

Name: _____

1. (46 points) Find the derivatives of the following functions. Do not simplify your answers.

(a) $f(x) = 2 \sin^{-1}(x^2 + 3x)$

(b) $f(x) = \cos^4\left(\frac{x^2 + 1}{x^2 - 1}\right)$

(c) $f(x) = 4x \tan x \sec x$

(d) $f(x) = 7(x^3 + 5)^{\ln x}$

(e) $f(x) = e^8 + 3 \ln(5^2)$

2. (15 points) Find an equation of the tangent line to the parametric curve

$$\begin{aligned}x &= t^3 - 5t \\y &= 7t^2 - t^4\end{aligned}$$

at the point where $t = 2$.

3. (15 points) A conical water tank with vertex down has a radius of 8 feet at the top and is 40 feet high. Suppose that water is being drained from the tank. At a certain time, the water is 10 feet deep, and the radius of the water's surface is decreasing by 3 feet per second. How fast is the volume of water in the tank changing at that time?

4. (15 points) An object thrown into the air reaches a height of $h(t) = 32t - t^4$ feet after t seconds.

(a) Find the maximum height the object reaches.

(b) When the object reaches its maximum height, what is its acceleration?

5. (4 points) This is a multiple choice problem. Circle the one correct answer. Let $f(x)$ and $g(x)$ be two functions which are differentiable for all x . Then $\frac{d}{dx}f(g(x)) =$
- | | | |
|-----------------|----------------------|-------------------------------|
| (a) $f'(g'(x))$ | (d) $f'(g(x))g'(x)$ | (g) $f'(x)g(x) + f(x)g'(x)$ |
| (b) $f'(g(x))$ | (e) $f'(g'(x))g'(x)$ | (h) $f'(x)g'(x) + f'(x)g'(x)$ |
| (c) $f(g'(x))$ | (f) $f'(x)g'(x)$ | (i) $g'(x) \ln(f(x))$ |

6. (5 points) Find $\tan(\cos^{-1}(4/5))$. Your answer should not involve any trigonometric or inverse trigonometric functions. **Show your work.**