Name ____________________ Calculus

Chapter 3 Practice Test

1. Under what conditions is a function not differentiable at a point?

2. Find the equation of the line tangent to $f(x) = x^4 + 2x^2 - 5$ at $x = 1$.

Find the derivative of the function.

3. $f(x) = \frac{1}{2} x^{10}$

4. $f(x) = e^{2x + 1}$

5. $f(t) = 5t^4 + 4t^3 - t^2 + 3t - 8$

6. $y = 4\cos\theta + 2\pi \sin\theta$

7. $y = \dfrac{8}{x^5}$

8. $f(x) = \dfrac{x^3}{x^2 + 2}$

9. $f(x) = (x^3 - 2x)(3x + 4)$

10. $f(t) = \dfrac{\sin t}{2t + 1}$

11. $g(x) = \cos 6x$

12. $f(t) = 9 \sin^2 4t$

13. $f(x) = -2 \ln x^4$

14. $y = \arctan 2x$

15. $h(x) = 2 \arcsin (x^2 - 2x)$

16. $y = \log_7 (x^2 + 5)$

17. Find dy/dx by implicit differentiation: $2x - 3y^2 = 16$

18. Find the second derivative of the function $g(x) = 1 + 4 \cos x$.

19. Let $f(x) = x^3 + 2$, and let g be the inverse of f. Find the value of g' when $f(x) = 10$

Original Function			Inverse Function		
x	f(x)	f'(x)	x	g(x)	g'(x)
	10				

20. The height of an object can be determined using the function $s(t) = -16t^2 + 40t + 52$ feet.

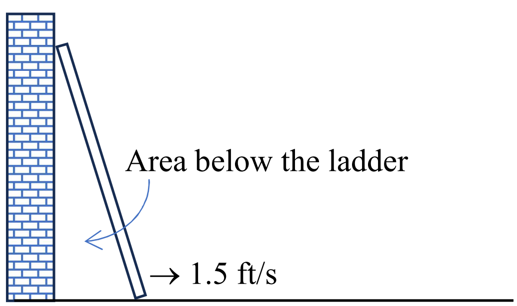
a. What is the object's velocity after 10 seconds?

b. What is its velocity after 25 seconds?

c. What is the maximum height the object reaches?

21. The radius of a sphere is expanding at a rate of 3 cm per second. How fast is the volume of the sphere changing when the radius is 8 cm long? $\text{Volume}_{\text{sphere}} = 4/3\ \pi\ r^3$

22. A 17-foot ladder is sliding down a wall. The horizontal distance of the base of the ladder from the wall is increasing at a rate of 1.5 feet per second. Find the rate of change of the area below the ladder when the base of the ladder is 8 feet from the wall.



23. Use Newton's method to find the zero for the function $f(x) = \sqrt{2x-1} - 2$. Use x = 2 for your first iteration. Continue the process until two successive approximations differ by less than 0.001.

n	x_n	$f(x_n)$	$f'(x_n)$	$x_n - f(x_n)/f'(x_n)$