Unit 4 Test Review
Honors ICM

Name: _____

Period: ____

Find the derivative of the function using the limit definition of derivative. Show all work!

1. $f(x)=2x+4$

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

3. $f(x)=\sqrt{x+6}$

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

Find the equation for the tangent line at the given point.

5. $f(x)=x^2+3x-1;\ (1,3)$

6. $f(x)=\dfrac{1+x^2}{x+5};\ (0,\dfrac{1}{5})$

7. $f(x)=-4x+3;\ x=-1$

8. $f(x)=-5x^2+8x+2;\ x=3$

9. $f(x)=(x^3+2)(2x^2-4);\ (1,2)$

10. $f(x)=\dfrac{1}{x^2};\ (-1,1)$

Find the slope of the tangent line to the graph of *f* at a given point.

11. $f(x)=(4x^3-5x^2)(1+2x);\ (-1,7)$

12. $f(x)=\dfrac{2x-3x^2}{5x+1};\ x=2$

13. $f(x)=\dfrac{6}{x+1};\ x=2$

14. $f(x)=3x^4-6x^2+5x-4;\ (-2,8)$

15. The displacement *s* (in meters) of a particle moving in a straight line is given by the equation of motion $s=4t^3+6t+2$, where *t* is measure in seconds. Find the instantaneous velocity of the particle s at times *t* = a, *t* = 1, and *t* = 3.

16. If an arrow is shot upward on the moon with a velocity of 58 miles/s, its height (in meters) after *t* seconds is given by $H=58t-.83t^2$. The moon is at the maximum.

a) Find the instantaneous velocity of the arrow after 1 second.

b) At what time *t* will the arrow hit the moon?

c) With what velocity will the arrow hit the moon?

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17. The position of a particle at time t sec is $s = t^3 - 6t^2 + 9t$ meters.

(a) Find the instantaneous velocity t = 4 seconds.

(b) Find the acceleration for each time the particle's velocity is zero.

18. A projectile is shot upward from the surface of earth with an initial velocity of 120 meters per second. The position equation is $s(t) = -4.9t^2 + 120t$

a. What is the projectile's velocity after 5 seconds?

b. What is the projectile's acceleration after 5 seconds?

Find the derivative.

19. $f(x) = 9x^{-2} + \sqrt{2x^5 - x^3}$

20. $f(x) = \dfrac{2}{5x^2}$

21. $g(x) = 3x^2 - \sqrt[4]{x^3}$

22. $h(x) = (x^3 - 7)(2x^3 + 3)$

23. $f(x) = (2x^2 - 4x + 1)(6x - 5)$

24. $f(x) = x^{3/2}(3x^2 - 2x + 6)$

25. $g(x) = 12x^{\frac{3}{5}} + \sqrt[3]{2x^4 - 4x}$

26. $f(x) = (x^5 - 2x^3)(7x^2 + x - 8)$

27. $h(x) = \dfrac{5x - 6}{3x + 7}$

28. $f(x) = \dfrac{6 - x + 3x^2}{4 - 9x}$

29. $f(x) = \dfrac{x^3 + 1}{x^3 - 1}$

30. $h(x) = \left(\dfrac{3x + 4}{6x - 1}\right)^3$

31. $g(x) = \dfrac{\sqrt[3]{x^2}}{3x - 5}$