Honors Pre-Calculus **Derivatives Quiz Review** **Name:___________________________________**
June 2013

Evaluate $\lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$ **to find the derivative. Show all work for full credit. Then evaluate** $f'(x)$ **at the given value for** x**.**

1. $f(x) = \sqrt{2x - 3}$ $f'(5)$ **1.)**___________________

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2. $f(x) = 4x^2 - 3x + 1$ $f'(0)$ **2.)**___________________

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Use rules of differentiation to find $f'(x)$**.**

3. $f(x) = -\frac{1}{2} + \frac{7}{5}x^3$ **3.)**___________________

4. $f(x) = x^2(x^2 + 1)$ **4.)**___________________

5. $f(x) = x^3 - 3x^2 + \frac{1}{6} - \frac{27}{x}$ **5.)**___________________

6. $f(x) = \sqrt{4x - 5}$ **6.)**___________________

7. $f(x) = \frac{1}{2x-1}$ **7.)**___________________

8. $f(x) = \frac{1}{\sqrt{x+4}}$ **8.)**___________________

9. $f(x) = (2x - 5)^3$ **9.)**___________________

10. $f(x) = 7$ **10.)**___________________

Find the equation of the line tangent to the curve at the given value for x.

11. $f(x) = x^2 + 4x$ at $x = 1$ **11.)**________________

12. $f(x) = x^3 - 2$ at $x = -2$ **12.)**________________

13. $f(x) = 4 - 2x - x^2$ at $x = -1$ **13.)**________________

14. $f(x) = x^3 - 5x^2 + 4x + 2$ at $x = 2$ **14.)**________________

Use the first and second derivatives to identify the local max and min, inflection point (s) and determine the interval where the curve is concave up and/or concave down. Then graph the function (do not use a calculator).

15. $f(x) = 4x^3 - 12x^2$

15. Local max___________________

Local min___________________

Pts of inflection______________

Concave up (interval)_________

Concave down (interval)______

16. $f(x) = 4x^3 - x^4$

16. Local max___________________

Local min___________________

Pts of inflection______________

Concave up (interval)_________

Concave down (interval)______

17. A rectangular plot of farmland will be bounded on one side by a river and on the other three sides by a single-strand electric fence. With 800 m of wire at your disposal, what is the largest area you can enclose, and what are its dimensions?

17.)________________

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18. A 216 m^2 rectangular pea patch is to be enclosed by a fence and divided into two equal parts by another fence parallel to one of the sides. What dimensions for the outer rectangle will require the smallest total length of fence? How much fence will be needed?

18.)________________

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19. Suppose $r(x) = 8\sqrt{x}$ represents revenue and $c(x) = 2x^2$ represents cost, with x measured in thousands of units. Is there a production level that maximizes profit? If so, what is it?

19.)________________

20. A textile manufacturer has daily production costs of $c(x) = 0.45x^2 - 110x + 10000$ where $c(x)$ is the total cost in dollars and x is the number of units produced per day. How many units should be produced each day to yield a minimum cost?

20.)________________

21. Find a number such that when its cube is subtracted from its square, the result is a maximum.

21.)________________

22. A 12" x 12" square sheet of cardboard is to be used to make an open-top box by cutting a small square from each corner and bending up the sides. How large a square should be cut from each corner to make the box have as large a volume as possible? What is the maximum volume of the box?

22.)________________

1. $\frac{1}{\sqrt{2x-3}}$; $\frac{\sqrt{7}}{7}$ **2**. $8x-3$; -3 **3**. $\frac{21}{5}x^2$ **4**. $4x^3+2x$ **5**. $3x^2-6x+\frac{27}{x^2}$ **6**. $\frac{2}{\sqrt{4x-5}}$

7. $-\frac{2}{(2x-1)^2}$ **8**. $-\frac{1}{2(x+4)\sqrt{x+4}}$ **9**. $6(2x-5)^2$ **10**. 0 **11**. $y=6x-1$ **12**. $y=12x+14$

13. $y=5$ **14**. $y=-4x+6$

15. Local max: $(0,\ 0)$; Local min: $(2,-16)$; Pt. of Inf. $(1,-8)$ Concavity up: $(1,\ \infty)$; Concave down: $(-\infty,\ 1)$

16. Local max: $(3,27)$; Local min: none; Pts. of Inf. $(0,\ 0)$; $(2,\ 16)$; Concavity up: $(0,\ 2)$; Concave down: $(-\infty,\ 0)$; $(2,\ \infty)$

17. Largest area = 80,000m^2; Dimensions: 200 m by 400 m **18**. Dimensions: 12 m by 18 m; Total length required: 72 m

19. Yes, 1000 units **20.** 122 units **21**. $\frac{2}{3}$ **22**. 2 inches; 128 in^2