2 pts. Each
No Decimals!

Name: _____

Math 180 - Homework #3

Write the ANSWERS ONLY on this page. Do your calculations/work elsewhere, then NEATLY transfer your answers to this page.

Differentiate #1 - 5 using the power rule. Do not simplify your answer ANSWER

1. $y = (x^3 + x^2 + 1)^5$

2. $y = \sqrt{x^2 + 1}$

3. $f(t) = \dfrac{2}{t - 3t^3}$

4. $\dfrac{d}{dP}\left(\sqrt{1 - 3P}\right)$

5. $\dfrac{d}{dx}(5x + 1)^4$

Differentiate #6 - 10 using the product rule. Do not simplify your answer ANSWER

6. $y = (x + 1)(x^3 + 5x + 2)$

7. $y = x^2(7x - 1)^2$ (Power rule will be needed in conjunction with product rule)

8. $y = (2x + 1)^{5/2}(4x - 1)^{3/2}$ (Power rule will be needed in conjunction with product rule)

9. $f(x) = (x^2 + 3)(x^2 - 3)^{10}$ (Power rule will be needed in conjunction with product rule)

10. $\dfrac{d}{dx}\left[x^7(3x^4 + 12x - 1)^2\right]$ (Power rule will be needed in conjunction with product rule)

Differentiate #11 - 15 using the quotient rule. Do not simplify your answer ANSWER

11. $y = \dfrac{x^2 + 2x - 1}{x^2 + 2x - 2}$

12. $y = \dfrac{3x^2 + 5x + 1}{3 - x^2}$

13. $y = \dfrac{x+3}{(2x+1)^2}$ (Power rule will be needed in conjunction with quotient rule)
SIMPLIFY ANSWER COMPLETELY FOR THIS PROBLEM

14. $f(x) = \dfrac{7}{9} + \dfrac{x^2+x+1}{x^5+1}$ (Hint: What do we know about differentiating constants?)

15. $\dfrac{d}{dx}\left(\dfrac{\sqrt{x}}{\sqrt{x}+4}\right)$ **SIMPLIFY ANSWER COMPLETELY FOR THIS PROBLEM**

#16 – 20: Find $\dfrac{dy}{dx}$ by implicit differentiation. **Simplify** your answer completely **ANSWER**

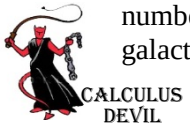
16. $x^2 - 2y^2 = 16$

17. $x^2 - 2xy = 6$ (Product rule will be needed)

18. $x^2y^2 - xy = 8$ (Product rule will be needed twice)

19. $x^{1/2} + y^{1/2} = 1$. (No fractional or negative exponents in answer)
(Write answer in radical form only)

20. Jabba sells stuffed Ewoks according to $p + \frac{1}{6}x^3 = 48$, where p is the price and x is the number of Ewoks. How fast is the price dropping if Ewoks are being introduced into the galactic marketplace at 5 per week when there are already 4 stuffed Ewoks available?



21. Yoda finds that his marginal costs for constructing light sabers is 0.04x + 150 dollars.
(A) If his fixed costs are $500 per day, what would his cost function look like? (A)

(B) Find the cost of increasing his business from 10 sabers/day to 12 sabers/day. (B)

22 – 23: Find the average value of the function f over the indicated interval [a,b] **ANSWER**

22. f(x) = 2x + 3; [0,2]

23. $f(x) = 2x^2 - 3$; [1,3] (Write answer as a fraction. No Decimals!)