Calculus Name_____

Chain Rule

Date_____ Period____

Differentiate each function with respect to *x* (CHAIN RULE = Deriv OUT * Deriv IN).

1) $f(x) = (x + 1)^{\frac{1}{3}}$

2) $y = (5x^3 - 2)^{-5}$

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

4) $y = \sqrt[4]{-5x^5 + 1}$

5) $f(x) = (5x^3 - 1)^{\frac{1}{2}}$

6) $y = (-2x^4 + 3)^{\frac{1}{5}}$

7) $y = (-4x^3 - 5)^{-5}$

8) $y = \sqrt{-x - 4}$

9) $y = (4x^2 - 3)^3$

10) $y = (-5x^2 - 4)^2$

11) $y = (5x^4 + 3)^{-3}$

12) $y = (-3x^5 - 2)^5$

13) $y = (-5x^2 - 1)^4$

14) $y = \dfrac{1}{(-5x - 4)^4}$

15) $y = \dfrac{1}{(x^3 + 3)^{\frac{1}{4}}}$

16) $y = (-x^2 - 4)^{-2}$

17) $y = \cos 3x^3$

18) $y = \tan 2x^2$

19) $f(x) = \cot 4x^4$

20) $y = \sin x^4$

21) $f(x) = \sec 5x^4$

22) $y = \csc 4x^3$

Use the PRODUCT rule and the CHAIN RULE to differentiate each function with respect to x.

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

24) $y = (-5x^2 - 4)^3(-5x^5 - 2)$

25) $y = (-x^4 + 5)(-5x^3 - 1)^3$

26) $y = (-3x^3 - 2)(-x^2 - 4)^3$

Use the QUOTIENT rule and the CHAIN RULE to differentiate each function with respect to x.

27) $y = \left(\frac{-2x^3 + 5}{-x - 3}\right)^5$

28) $y = \frac{(-4x + 1)^5}{-x^2 + 2}$