Name:_____

3.3 Product and Quotient Rule Worksheet

Find the derivatives of the following:

1. $y = x^2 \ln x$

2. $y = (\ln x)(\sin x)$

3. $y = \dfrac{x}{x-1}$

4. $y = x^3 \sin x$

5. $y = \dfrac{\sin x}{x^3}$

6. $y = (x^2 + 2x)\ln x$

7. $y = \sqrt[3]{x}e^x$

8. $y = \dfrac{1}{2}\sqrt{x}\cos x + 4x^2$

9. $y = \dfrac{(2x+1)^2}{x^2+2}$

10. $y = \dfrac{x-1}{x+1}$

Find the second derivatives of the following:

11. $y = 3x^2 - 4x + 2$

12. $y = x \ln x$

Find when the derivative is equal to zero:

13. $y = x^2 - 6x + 10$

14. $y = 2x^3 - 3x^2 - 36x + 12$

Product and Quotient Worksheet: Key

1. $y' = 2x \ln x + x$

2. $y' = \dfrac{\sin x}{x} + (\ln x)(\cos x)$

3. $y' = \dfrac{-1}{(x-1)^2}$

4. $y' = 3x^2 \sin x + x^3 \cos x$

5. $y' = \dfrac{x \cos x - 3 \sin x}{x^4}$

6. $y' = 2x \ln x + 2 \ln x + x + 2$

7. $y' = \dfrac{e^x}{x^{2/3}}\left(\dfrac{1}{3} + x\right)$

8. $y' = \dfrac{\cos x}{4\sqrt{x}} - \dfrac{\sqrt{x} \sin x}{2} + 8x$

9. $y' = \dfrac{-4x^2 + 14x + 8}{(x^2 + 2)^2}$

10. $y' = \dfrac{2}{(x+1)^2}$

11. $y'' = 6$

12. $y'' = \dfrac{1}{x}$

13. $x = 3$

14. $x = 3, -2$