

## Lesson 13 Worksheet

February 12, 2018

Find the **second** derivative of the following functions at the given value:

1.  $f(x) = \ln(x^2)$  at  $x = 2$

2.  $s(t) = t^4 e^{3t}$  at  $t = -1$

3.  $y = e^{3x+1} \sin 4x$  at  $x = \frac{\pi}{16}$

4.  $y = \sin s \cos s$  at  $s = \pi$

5.  $y = \sin x \sec x$  at  $x = \pi/3$  (Hint: Simplify first!)

6.  $y = \frac{1}{x}$  at  $x = -\frac{1}{2}$

7.  $y = \frac{2}{x^3}$  at  $x = -2$

8.  $g(x) = (3x + 1)^3(x^2 - 1)^4$  at  $x = 0$

Answers:

1.  $f''(x) = \frac{-2}{x^2}$ ;  $f''(2) = \frac{-1}{2}$

2.  $s''(t) = 3e^{3t}(3t^4 + 8t^3 + 4t^2)$ ;  $s''(1) = -3e^{-3}$

3.  $y'' = e^{3x+1}(24 \cos(4x) - 7 \sin(4x))$ ;  $y''(\frac{\pi}{16}) = \frac{17\sqrt{2}}{2}e^{(3\pi+16)/16}$

4.  $y'' = -4 \sin x \cos s$ ;  $y''(\pi) = 0$

5.  $y'' = 2 \sec^2 x \tan x$ ;  $y'(\pi/3) = 4\sqrt{3}$

6.  $y'' = \frac{2}{x^3}$ ;  $y''(-\frac{1}{2}) = -16$

7.  $y'' = \frac{24}{x^5}$ ;  $y''(-2) = \frac{3}{4}$

8.  $y'' = 6(3x+1)(x^2-1)^3(23x^2+8x-9) + 6x(3x+1)^2(x^2-1)^2(23x^2+8x-9) + (46x+8)(3x+1)^2(x^2-1)^3$  (this isn't completely simplified);  $y''(0) = 46$