

## Chapter 3 Review (Whole Chapter) Supplement

Find the derivative of each.

1.  $y = \ln^4 x$

2.  $f(x) = \frac{x^3}{2\ln x}$

3.  $y = 2^{-4x}$

4.  $f(x) = \sin^{-1}(5x)$

5.  $f(x) = 2\arcsin(3x)$

6.  $f(x) = 3^{x-2}$

7. The waitress pours coffee into your cup at 8:00 am. The coffee is  $170^\circ$  when freshly poured and after 3 minutes in a room at  $72^\circ\text{F}$ , the coffee has cooled to  $140^\circ\text{F}$ . Find the temperature at any time  $t$  and find the time at which the coffee is  $100^\circ\text{F}$ .

8. Find the linear approximation of the function  $f(x) = \sqrt{1-x}$  at  $x = 0$ . Then use this to approximate  $f(0.9)$

9. Use differentials to approximate the change in area of a circle when radius is increased from 5 to 5.1.

Answers:

1.  $y' = \frac{4(\ln x)^3}{x}$

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

3.  $y' = -4\ln 2 \cdot 2^{-4x}$

4.  $f'(x) = \frac{5}{\sqrt{1-25x^2}}$

5.  $f'(x) = \frac{5}{\sqrt{1-9}}$

6.  $f'(x) = 3^{x-2} \cdot \ln 3$

7. After 10.3 min, so 10 min 18 sec thus 8:10:18sec

8.  $f(x) = -\frac{1}{2}x + 1, 11/20$

9. 3.14159