Answers to Additional Problems Unit II

1. Use (1,6) and (2,13) to obtain the average rate of change = 7.
Use (1,6) and $\left(x, x^2+4x+1\right)$ to show that the Instantaneous rate of change at $x=1$ is $\lim_{x\to 1}(x+5) = 6$.

2. Use one of the definitions of a derivative to obtain: $\frac{dy}{dx} = 2x+7$

3. A. $\frac{dy}{dx} = -15x^4 + 6$ B. $\frac{dy}{dx} = 20x^{-5} + \frac{1}{2}x^{-\frac{1}{2}}$

C. $\frac{dy}{dx} = \frac{41}{(7x+3)^2}$ D. $\frac{dy}{dx} = x^4\cos x + 4x^3\sin x$

E. $\frac{dy}{dx} = 3 + 5\csc x\cot x - \csc^2 x$ F. $\frac{dy}{dx} = -6\cos^2 2x\sin 2x$

4. Substitute $y = \tan x$, $y' = \sec^2 x$, $y'' = 2\sec^2 x\tan x$ into the given equation and verify.

5. $y' = \frac{3x^2+y^2}{4-2xy}$

6. $\frac{dx}{dt} = -80\ \frac{feet}{radians} = -\frac{4p}{9}\ \frac{feet}{\deg ree}$

7. $y'' = \frac{2y}{x^2}$

8. $-\frac{7}{4}\ \frac{ft}{\min}$

9. $\frac{dh}{dt} = \frac{16}{5p}\ \frac{ft}{\min}$

10. 1

11. $y = x$

12. 8.96

13. a) $dy = (2x+3)dx$ b) $\Delta x = 2x\Delta x + (\Delta x)^2 + 3\Delta x$

14. $dV = \pm 96\ cu.cm.$, $\dfrac{de}{e} = \pm 6.25\%$, $\dfrac{dV}{V} = \pm 18.75\%$