

Lesson 4

8. $y = -x^2 + 5x$ with slope of -2 .

$$\frac{dy}{dx} = -2x + 5$$

∴ tangent has slope $m = \frac{1}{2}$

$$\frac{1}{2} = -2x + 5$$

∴ at $x = \frac{9}{4}$ normal has slope -2 .

$$1 = -4x + 10$$

$$-9 = -4x$$

$$x = \frac{9}{4}$$

$$y = -\left(\frac{9}{4}\right)^2 + 5\left(\frac{9}{4}\right)$$

$$y = -\frac{81}{16} + \frac{45}{4}$$

$$y = \frac{99}{16}$$

$$\left(\frac{9}{4}, \frac{99}{16}\right)$$

$$-2 = \frac{y - \frac{99}{16}}{x - \frac{9}{4}}$$

$$-2x + \frac{9}{2} = y - \frac{99}{16}$$

$$2x + y - \frac{99}{16} - \frac{9}{2} = 0$$

$$2x + y - \frac{171}{16} = 0$$

$$32x + 16y - 171 = 0$$

Lesson 4

14 If $s(t) = t^2 - \frac{1}{3}t^3$

then $s'(t)$ is the rate of change of distance to time $\rightarrow$ or speed.

$$s'(t) = 2t - t^2$$

$$\frac{1}{2} = 2t - t^2$$

$$2t^2 - 4t + 1 = 0$$

$$t = \frac{4 \pm \sqrt{(-4)^2 - 4(2)(1)}}{4}$$

$$t = \frac{4 \pm \sqrt{8}}{4}$$

$$t = \frac{4 \pm 2\sqrt{2}}{4}$$

$$t = \frac{2 \pm \sqrt{2}}{2}$$

15.

$$a) y = -2x^3 + x - 4$$

$$\frac{dy}{dx} = -6x^2 + 1$$

$$2 = -6x^2 + 1$$

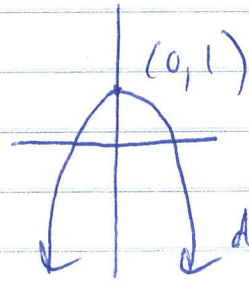
$$6x^2 = -1$$

$$x^2 = -\frac{1}{6}$$

no solution.

$$b) \frac{dy}{dx} = -6x^2 + 1$$

has max. value of 1.



or max slope of any tangent is 1.