

$$1. a) N(8) = \frac{500(8)^2}{\sqrt{280+8^2}} + 10(8)$$

$$= \frac{32000}{\sqrt{344}} + 80$$

$$= 1805.32$$

$$\approx \boxed{1805}$$

$$b) N'(x) = \frac{\sqrt{280+x^2}(1000x) - (500x^2)(1/2)(280+x^2)^{-1/2}}{(\sqrt{280+x^2})^2}$$

$$N'(6) = \frac{\sqrt{280+6^2}(6000) - (500)(36)(1/2)(280+6^2)^{-1/2}}{280+6^2}$$

$$N'(6) = 335.9242$$

$$= \boxed{335.9}$$

$$2. y = (2v+1)[3-(2v+1)]$$

$$= (2v+1)[-2v+2]$$

$$= [2(x^3-5x)+1][-2(x^3-5x)+2]$$

$$= [2x^3-10x+1][-2x^3+10x+2]$$

$$\frac{dy}{dx} = (2x^3-10x+1)(-6x^2+10) + (-2x^3+10x+2)(6x^2-10)$$

$$\text{At } x=2$$

$$\frac{dy}{dx} = (16-20+1)(-24+10) + (-16+20+2)(24-10)$$

$$= \boxed{126}$$

$$3. a) g\left(\frac{1}{x}\right) = 5\sqrt{\frac{1}{x}-1}$$

$$f\left(5\sqrt{\frac{1}{x}-1}\right) = 3\left(5\sqrt{\frac{1}{x}-1}\right)^2 - 8 = 3\left[25\left(\frac{1}{x}-1\right)\right] - 8$$

$$= \frac{75}{x} - 75 - 8 = \boxed{\frac{75}{x} - 83}$$

b) evaluate $\frac{75}{x} - 83$ at $x = 1/2$

$$\frac{75}{1/2} - 83 = 150 - 83 = \boxed{67}$$