Find all x for which the tangent to the graph of  $f(x) = \sin^{-1}(x)$  at (x, f(x)) has slope 2. 1.

Solve: 
$$f(x) = 2$$

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

$$1 = 2\sqrt{1-x^2}$$

$$1^2 = (2\sqrt{1-x^2})^2$$

$$1 = 4(1-x^{2})$$

$$1 = 4 - 4x^{2}$$

$$4x^{2} = 3$$

$$x^{2} = \frac{3}{4}$$

$$x = +\sqrt{3} = +\sqrt{3}$$

$$x = +\sqrt{3} = -\sqrt{3}$$

2. 
$$D_x \left[ \sec^{-1}(x^3) \right] = \frac{1}{|\chi^3| \sqrt{|\chi^3|^2 - 1}} \left( 3\chi^2 \right)^2 - \frac{3\chi^2}{|\chi^3| \sqrt{|\chi^6| - 1}} = \frac{3}{|\chi| \sqrt{|\chi^6| - 1}}$$

3. 
$$D_x[(\tan^{-1}(x))^3] = 3(\tan^{-1}(x))T_x[\int \tan^{-1}(x)]$$

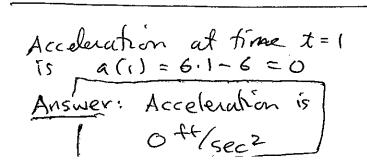
$$= 3(\int \tan^{-1}(x)^2 \int \frac{3(\int \tan^{-1}(x))^2}{1+x^2}$$

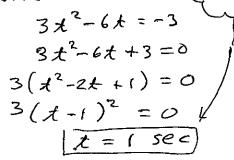
4. An object moving on a straight line is  $s(t) = t^3 - 3t^2$  feet from its starting point at time t seconds. Find its acceleration when its velocity is -3 feet per second.

Acceleration: a(x) = 6t-6

To find when velocity is -3, solve V(t) = -3

3x2-6x=-3





Find all x for which the tangent to the graph of  $f(x) = \sin^{-1}(x)$  at (x, f(x)) has slope 5.

Solve: 
$$f(x) = 5$$
  $7 = 25(1-x^2)$   
 $1 = 25 - 25x^2$   
 $1 = 25 - 25x^2$   
 $1 = 5\sqrt{1-x^2}$   
 $1 = 5\sqrt{1-x^2}$   
 $1 = 5\sqrt{1-x^2}$   
 $1 = 5\sqrt{1-x^2}$ 

$$1 = 25(1-x^{2})$$

$$1 = 25 - 25x^{2}$$

$$25x^{2} = 24$$

$$x^{2} = \frac{24}{25}$$

$$25(1-X)$$

$$= 25-25X^{2}$$

$$X^{2} = 24$$

$$X^{2} = \frac{24}{25}$$

$$X = \pm \sqrt{\frac{24}{25}} = \pm \sqrt{\frac{24}{5}} = \pm 2\sqrt{\frac{6}{5}}$$

2. 
$$D_x[(\sec^{-1}(x))^4] = 4(\sec^{-1}(x))^3 = \frac{4(\sec^{-1}(x))^3}{|x|\sqrt{x^2-1}}$$

$$= \frac{4(\sec^{-1}(x))^{3}}{1x1\sqrt{x^{2}-1}}$$

3. 
$$D_x \left[ \tan^{-1}(x^4) \right] = \frac{1}{1 + (x^4)^2} 4x^3 = \frac{4x^3}{1 + x^8}$$

4. An object moving on a straight line is  $s(t) = 2 + t + t^3$  feet from its starting point at time t seconds. Find its velocity when its acceleration is 12 feet per second per second.

$$S(t) = 1+3t^2 = V(t)$$
 (relocity at time t)  
 $V(t) = 0+6t = a(t)$  (acceleration at time t)  
To find when acceleration is 12 ft/sec?, solve  
 $a(t) = 12 \implies (t = 2 \text{ Sec})$   
The velocity at  $t = 2 \text{ Sec}$  only is Therefore  
 $V(2) = 1+3(2^2) = 13 \text{ ft/sec}$  (-Answer