Find the derivative of each function.

1a) $g(x) = 3 \arccos \frac{x}{2}$

1b) $f(x) = 2 \arcsin(x - 1)$

Note: $\sqrt{1 - \frac{x^2}{4}} = \sqrt{\frac{4 - x^2}{4}} = \frac{\sqrt{4 - x^2}}{2}$

1c)

1d)

1e)

2a)

2b)

3a) $h(t) = \sin(\arccos t)$

3b) $f(x) = \tan\left(\arccos\frac{x}{2}\right)$

$$h(t) = \sin(\arccos t) = \sqrt{1 - t^2}$$

$$h'(t) = \frac{1}{2}(1 - t^2)^{-1/2}(-2t)$$

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

Find the equation of the tangent line at the given point of each equation.

4a) $y = \arctan\frac{x}{2}, \quad \left(2, \frac{\pi}{4}\right)$

4b) $y = 4x \arccos(x - 1), \quad (1, 2\pi)$

$$y' = \frac{1}{1 + (x^2/4)}\left(\frac{1}{2}\right) = \frac{2}{4 + x^2}$$

At $\left(2, \frac{\pi}{4}\right)$, $y' = \frac{2}{4 + 4} = \frac{1}{4}$.

Tangent line: $y - \frac{\pi}{4} = \frac{1}{4}(x - 2)$

4c) $x^2 + x \arctan y = y - 1, \quad \left(-\frac{\pi}{4}, 1\right)$

5) AP MULTIPLE CHOICE EXAMPLES

1) If $y = \arctan(\cos x)$, then $\frac{dy}{dx} =$

(A) $\frac{-\sin x}{1+\cos^2 x}$ (B) $-(\operatorname{arcsec}(\cos x))^2 \sin x$ (C) $(\operatorname{arcsec}(\cos x))^2$

(D) $\frac{1}{(\arccos x)^2 + 1}$ (E) $\frac{1}{1+\cos^2 x}$

2) $\frac{d}{dx}(\arcsin 2x) =$

(A) $\frac{-1}{2\sqrt{1-4x^2}}$ (B) $\frac{-2}{\sqrt{4x^2-1}}$ (C) $\frac{1}{2\sqrt{1-4x^2}}$

(D) $\frac{2}{\sqrt{1-4x^2}}$ (E) $\frac{2}{\sqrt{4x^2-1}}$