d) $D\left[\frac{\arcsin x}{x^3}\right] = \arcsin(x)(-3)x^{-4} + \frac{1}{x^3}\frac{1}{\sqrt{1-x^2}}$

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

f) $D[\ln(\arctan(e^x))] = \frac{1}{\arctan(e^x)}\frac{1}{1+(e^x)^2}\cdot e^x$

$= \frac{e^x}{\arctan(e^x)(1+e^{2x})}$

g) $D[\arccos(\sin x)] = -\frac{1}{\sqrt{1-\sin^2 x}}\cos x$

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

3.) For c); se fasit av Hveberg (Google "Kalkulus lósningsforslag")

d) $\lim_{x\to 1^-} \frac{\arcsin x - \frac{\pi}{2}}{\sqrt{1-x}}$ $\to 0$

$\downarrow$ 0

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

("$\frac{0}{0}$": L'Hôpital)

$$= \lim_{x \to 1^+} \frac{-\frac{1}{\sqrt{1-x}\sqrt{1+x}}}{\frac{1}{\sqrt{1-x}}} = \lim_{x \to 1^-} -\frac{1}{\sqrt{1+x}}$$

(Konjugatsetning)

$$= -\frac{1}{\sqrt{2}} \quad \text{(Trodde feil i fasit)}$$

$\frac{\pi}{2} - \arctan x$

f) $\lim_{x \to \infty} x$

$$= e^{\lim_{x \to \infty} (\frac{\pi}{2} - \arctan x) \ln x}$$

M: $\lim_{x \to \infty} (\frac{\pi}{2} - \arctan x) \ln x$

$\frac{\pi}{2} - \arctan x \to 0$, $\ln x \to \infty$

$$= \lim_{x \to \infty} \frac{\frac{\pi}{2} - \arctan x}{\frac{1}{\ln x}} = \lim_{x \to \infty} \frac{-\frac{1}{1+x^2}}{-\frac{1}{(\ln x)^2}\frac{1}{x}}$$

"0/0": L'H

$$= \lim_{x \to \infty} \frac{x(\ln x)^2}{1+x^2} = \lim_{x \to \infty} \frac{(\ln x)^2 + x\, 2\ln(x)\frac{1}{x}}{2x}$$

"∞/∞": L'H

$$= \frac{1}{2}\lim_{x \to \infty} \frac{(\ln x)^2 + 2\ln x}{x} = \frac{1}{2}\lim_{x \to \infty} \frac{2\ln(x)\frac{1}{x} + \frac{2}{x}}{1}$$

"∞/∞": L'H

$$= \frac{2}{2}\lim_{x \to \infty} \frac{\ln x + 1}{x} = \lim_{x \to \infty} \frac{\frac{1}{x}}{1} = \underline{0}$$

"∞/∞": L'H

$$\Rightarrow \lim_{x \to \infty} x^{\frac{\pi}{2} - \arctan x} = e^0 = \underline{1}$$