

Self Study exercises Math B2 week 2

1. Find an equation for the tangent to the curve $y = \frac{1}{x^2}$ at the point $(-1, 1)$. Find all intersection points of this tangent with the curve. Graph tangent and curve.
2. [Thomas 3.3.27-30] Match the functions with the derivatives. Also give possible formulas for $f_1(x)$, $f_2(x)$, $f_3(x)$ and $f_4(x)$.
3. Find $\frac{dw}{dz}$ and $\frac{d^2w}{dz^2}$ for

$$w = e^z(z - 1)(z^2 + 1)$$

Establish also a general product rule for $\frac{d}{dx}(uvw)$, see also page 140 in Thomas

4. Find the derivative of

$$y = \ln 3\theta e^\theta$$

with respect to θ .

5. See [Thomas, page 223] for The Extreme Value Theorem. See [Thomas, page 227], exercises 1 - 4: Determine from the graph whether the function has any absolute extreme values on $[a, b]$. In that cases can we apply the theorem?
6. Which ones are correct? Motivate.

(a)

$$\lim_{x \rightarrow 3} \frac{x - 3}{x^2 - 3} = \lim_{x \rightarrow 3} \frac{1}{2x} = \frac{1}{6} \quad (\text{l'H\^opital})$$

(b)

$$\lim_{x \rightarrow 3} \frac{x - 3}{x^2 - 3} = \frac{0}{6} \quad (\text{limit law quotient rule})$$

(c)

$$\lim_{x \rightarrow 3} \frac{x - 3}{x^2 - 3} = \lim_{x \rightarrow 3} \frac{1(x^2 - 3) - 2x(x - 3)}{(x^2 - 3)^2} = \frac{6}{36} \quad (\text{derivative quotient rule})$$