Math 32, Homework 6 on sections 6.7, 6.8

Do these 10 questions and *check that your answers match the solutions on page 2*. They will not be collected, but similar questions could appear on the next quiz.

(1) Prove that

$$\frac{d}{dx}\tanh(x) = \operatorname{sech}^2(x)$$

and state any definitions and results you used.

(2) Find:

$$\lim_{x\to\infty} \frac{x+2000}{3x+1}$$

(3) Compute:

$$\lim_{x\to 0} \frac{\sin(4x)}{\sin(3x)}$$

(4) Compute:

$$\lim_{x\to 0} \frac{\cos(4x)}{\cos(3x)}$$

(5) Calculate:

$$\lim_{x\to 0} \frac{\tanh(x^2)}{\tan(x^2)}$$

(6) Calculate:

$$\lim_{x\to 0} \frac{x\cdot 2^x}{2^x-1}$$

(7) Find:

$$\lim_{x\to\infty} x^2\cdot 3^{-x}$$

(8) Find:

$$\lim_{x\to\infty} \frac{\ln(x)}{x}$$

(9) Compute:

$$\lim_{x\to\infty} x^{1/x}$$

(10) Compute:

$$\lim_{x\to 0} \frac{\cos(x)-1}{x^2}$$

You can also try questions from sections 6.7, 6.8 in the book listed on the syllabus.

Answers to questions (1)-(10):

(1) See similar proofs in section 6.7.

(2) $1/3$

(3) $4/3$

(4) 1

(5) 1

(6) $1/\ln 2$

(7) 0

(8) 0

(9) 1

(10) $-1/2$