This file contains questions spanning CLP-1. It should not be taken as a complete review of the course, but rather as a jumping-off point. If you struggle with one question, go back to review its entire section. Sections are noted at the bottom of each page.

2024-08-19

This file contains questions spanning CLP-1. It should not be taken as a complete review of the course, but rather as a jumping-off point. If you struggle with one question, go back to review its entire section. Sections are noted at the bottom of each page.

In 2015, there were 6 quizzes during the semester. Their questions are compiled here as a short semester review.

You can show the questions one-by-one by scrolling to the Solutions section.

S1

Find all solutions to $x^3 - 3x^2 - x + 3 = 0$

Factoring functions is a high-school review topic. It comes in especially handy in Section 3.6, Sketching Graphs

S2

Compute the limit $\lim\limits_{x \to 2} \dfrac{x-2}{x^2-4}$

S3

Find all values of c such that the following function is continuous:

$$f(x) = \begin{cases} 8 - cx & \text{if} \quad x \leq c \\ x^2 & \text{if} \quad x > c \end{cases}$$

Use the definition of continuity to justify your answer.

S4

Compute

$$\lim_{x\to-\infty} \frac{3x+5}{\sqrt{x^2+5}-x}$$

S5

Find the equation of the tangent line to the graph of $y = \cos(x)$ at $x = \dfrac{\pi}{4}$.

S6

For what values of x does the derivative of $\dfrac{\sin(x)}{x^2+6x+5}$ exist?

S7

Find $f'(x)$ if $f(x) = (x^2+1)^{\sin(x)}$.

S8

Consider a function of the form $f(x) = Ae^{kx}$ where A and k are constants. If $f(0) = 3$ and $f(2) = 5$, find the constants A and k.

This is a review of high school material. This type of calculation comes up in Section 3.3: Exponential Growth and Decay

S9

Consider a function $f(x)$ which has $f'''(x) = \dfrac{x^3}{10 - x^2}$. Show that when we approximate $f(1)$ using its second Maclaurin polynomial, the absolute error is less than $\frac{1}{50} = 0.02$.

S10

Estimate $\sqrt{35}$ using a linear approximation

S11

Let $f(x) = x^2 - 2\pi x - \sin(x)$. Show that there exists a real number c such that $f'(c) = 0$.

S12

Find the intervals where $f(x) = \frac{\sqrt{x}}{x+6}$ is increasing.

L1

Compute the limit $\lim_{x \to 1} \frac{\sqrt{x+2} - \sqrt{4-x}}{x-1}$.

L2

Show that there exists at least one real number c such that $2\tan(c) = c + 1$.

L3

Determine whether the derivative of following function exists at $x = 0$

$$f(x) = \begin{cases} 2x^3 - x^2 & \text{if } x \leq 0 \\ x^2 \sin\left(\dfrac{1}{x}\right) & \text{if } x > 0 \end{cases}$$

You must justify your answer using the definition of a derivative.

L4

If $x^2\cos(y) + 2xe^y = 8$, then find y' at the points where $y = 0$. You must justify your answer.

L5

Two particles move in the cartesian plane. Particle A travels on the x-axis starting at $(10, 0)$ and moving towards the origin with a speed of 2 units per second. Particle B travels on the y-axis starting at $(0, 12)$ and moving towards the origin with a speed of 3 units per second. What is the rate of change of the distance between the two particles when particle A reaches the point $(4, 0)$?

L6

Find the global maximum and the global minimum for $f(x) = x^3 - 6x^2 + 2$ on the interval $[3, 5]$.