Quizzes of TTK4225 - Systems Theory, Autumn 2020

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Question 18

How would you describe a derivative, $\dfrac{d}{dx}$?

1. the instantaneous rate of change of something with respect to time
2. the instantaneous velocity of the variable
3. the tangent of a graph
4. the rate of change of something with respect to x
5. none of the above
6. I do not know

Question 19

Consider $f(x) = \dfrac{\sin x}{x}$. Is the limit $\lim\limits_{x \to 0} f(x) = f(0)$ correct?

1. no, since $f(x)$ is not continuous at $x = 0$, thus $f(0)$ is not defined

2. no, since the limit when $x \to 0$ does not exist

3. yes, since $\lim\limits_{x \to 0} f(x) = f(0) = \dfrac{0}{0} = 0$

4. yes, since $f(x)$ is not continuous at $x = 0$

5. none of the above

6. I do not know

Question 20

What is the expansion of the derivative $\dfrac{d}{dx}f(x)g(x)$?

1. $f'(x)g'(x)$
2. $\dfrac{f'(x)g(x) - f(x)g'(x)}{g(x)^2}$
3. $f(x)g'(x) - f'(x)g(x)$
4. $f'(x)g(x) + f(x)g'(x)$
5. I do not know

Question 21

For which a is the continuous-time system $\dot{y} = ay$ asymptotically stable?

1. $a < 0$
2. $a \leq 0$
3. $a = 0$
4. $a \geq 0$
5. $a > 0$
6. I do not know

Question 22

For which a is the discrete-time system $y(k+1) = ay(k)$ asymptotically stable?

1. $|a| < 1$

2. $|a| \leq 1$

3. $|a| = 1$

4. $|a| \geq 1$

5. $|a| > 1$

6. I do not know