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Instructions

1. **No calculators or other electronic devices are allowed during this exam.**

2. **You may use one page of notes, but no books or other assistance during this exam.**

3. **Read each question carefully, and answer each question completely.**

4. **Show all of your work. No credit will be given for unsupported answers, even if correct.**

5. **Write Name & PID on at the top of each page.**

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0. (1 point) Carefully read and complete the instructions at the top of this exam sheet and any additional instructions written on the chalkboard during the exam.

1. (6 points) Consider the following graph.
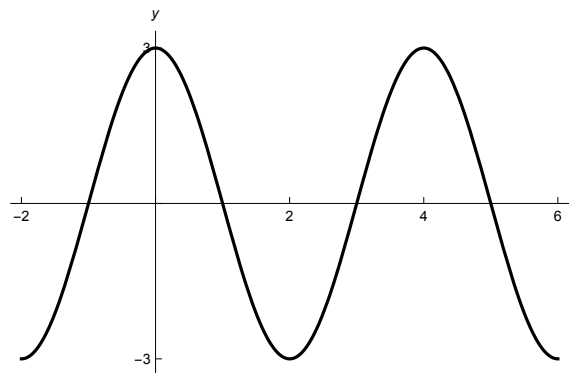
(a) Given that $y = A\cos(Bt)$, find the values of A and B.

(b) Given that $y = A\sin(Bt + D)$, find the value of D.

2. (6 points) In a chemical reaction, 0.13 of the chemical's mass is eliminated after each hour. The mass of the chemical at the beginning of the reaction is 10g, and the mass $M(t)$ of the chemical at time t (in hours) is given by the formula

$$M(t) = M_0 \, a^t$$

(a) Find M_0 and a.

(b) Find the time t at which 0.99 of the chemical is eliminated. Leave your answer in symbolic form.

(c) Find the number k so that the function $M(t)$ can be expressed in the form $M(t) = M_0 \, e^{-kt}$. Leave your answer in symbolic form.

Version A
(This exam is worth *25* points.)

Name: _____

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3. (6 points) Consider the function $f(x) = \begin{cases} \frac{x^2-4}{x-2} & \text{if } x < 2 \\ ax & \text{if } x \geq 2 \end{cases}$.

(a) What is the value of $f(2)$?

(b) Determine the value of a for which $f(x)$ is continuous for all x. Be sure to show the limit you evaluated to arrive at your answer.

4. (6 points) Let $f(x) = \dfrac{5}{x}$. Using the definition of the derivative, evaluate $f'(1)$.

Note: In order to earn credit, you must algebraically evaluate the limit specified by the definition of the derivative.