

Calculus 1; Quiz 0

1. Print your name. You must print it legibly. Also mention your year in school and your probable major.
2. Why are you taking this course ? Will you be taking other math or statistics courses ?
3. What, when, where, and from whom was the last math course you took ?
4. What is Calculus ? Why do we study it ?
5. How many hours per week do you plan to put into this class ? What will you do if you start having difficulties with the material ?
6. Why are you taking a night course ? Are you aware that they are often more demanding on the student ?
7. What grade do you honestly expect to get from this class ? Why ?

0. Print your name: _____

1. How is the graph of $y = \pi - f(x + \sqrt{2})$ obtained from that of $y = f(x)$.

2. A piece of wire ten inches long is to be cut in two to form a circle and a square. Find a formula for the total area enclosed by these two regions (as a function of a single variable).

3. For what value of k is the graph of $f(x) = \begin{cases} \frac{1}{2}x^2 + k, & \text{if } x \leq 1, \\ x, & \text{if } x > 1, \end{cases}$ a single continuous curve? Sketch the graph.

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1. Draw three secant lines from $x = 2.5, 2.1, 2.01$ to $x = 2$ for $y = x^3 - 11x$ and estimate the slope of the tangent line at $x = 2$.

2. For what values of a and b is $f(x) = \begin{cases} ax^2 - b, & \text{if } x < 2, \\ b, & \text{if } x = 2, \\ x + 4, & \text{if } x > 2, \end{cases}$ continuous at $x = 2$?

3. Using values of $h = .1, .01, .001$ and $h = -.1, -.01, -.001$ estimate $\lim_{h \rightarrow 0} \frac{2^h - 1}{h}$

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1. Draw the graph of a function $y = f(x)$ which is defined and non-zero for all x , with $\lim_{x \rightarrow -\infty} f(x) = -\infty$, $\lim_{x \rightarrow 3} f(x) = +\infty$, and $\lim_{x \rightarrow +\infty} f(x) = 0$

2. Find $\lim_{x \rightarrow -\infty} \frac{3x^2 - 5x^3 + 7}{8x^3 + 19}$. Show your work.

3. Suppose $f(x) = \sqrt{x}$. Using $f'(x) = \frac{1}{2\sqrt{x}}$, find the tangent line to $y = f(x)$ at $x = 4$.

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1. Using the definition, find $\frac{d}{dx}(3x^2 + 5x)$.

2. Use the derivative to approximate $\sqrt{24.97}$.

3. Graph a function whose derivative is always positive but whose derivative is also always decreasing.

0. Print your name: _____

No Calculators allowed.

1. Find $\frac{d}{dx} \left((3x^2 + 5x) \cdot \cos(\pi x^2 + x) \right)$.

2. Find $\frac{d}{dx} \left(\frac{\pi^x - \tan(\pi x)}{5 + \sqrt{x^4 + 1}} \right)$.

3. Find all x where $y = x^2 e^x$ is increasing.

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No Calculators allowed.

1. Let $P(t)$ be the price of a stock listed on the New York Stock Exchange, where P is in dollars per share and t is in days (with $t = 0$ being the 1/1/00). What are the units of $P'(t)$? What does $P'(286) < 0$ and $P''(286) > 0$ say about the stock?

2. Find a formula for $\frac{dy}{dx}$ given that $x^2 + y^2 = e^{-x/y}$.

3. Find the line tangent to $xy^2 - 3x^2y = \sin(3x^2 - y)$ at $(1, 3)$

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No Calculators allowed for exercises 1 and 2.

1. Find the derivative of $y = \ln(5x^2 + 10) + \arctan(1 + x^3)$

2. Find the derivative of $y = (3x^2 + 1)^{x+5}$

3. The radius of a circular silicon wafer is estimated to be 0.14 cm with a possible maximum error of ± 0.003 cm. Estimate the error and relative error that may result from using this measurement to calculate the area of the circular region.

0. Print your name: _____

1. Two cars leave Mobile at noon. One travels north at 40 mph, the other west at 30 mph. At what rate is the distance between them changing twenty minutes later ?

2. A spherical balloon is being inflated at the rate of 5 cubic inches a minute. At what rate is the radius changing after ten minutes ?

3. A man 6 feet tall is walking away at the constant speed of $\frac{1}{2}$ feet/sec from a streetlight that is 18 feet high. At what rate is the length of his shadow changing ?

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1. Find $\lim_{x \rightarrow 0} \frac{e^x - x - 1}{x^2}$

2. A 50 foot straight section of fencing is to be completed into a rectangular garden using 120 feet of new fencing. How should it be done to yield maximum area ?

3. Suppose $C(x) = 100 + 8x + x^2$ is the cost function for producing widgets. Find the marginal and average cost. What production level minimizes average cost ?