

This exam consists of:

- 5 true/false questions (1-5), worth 2 points each
- 10 multiple choice questions (6-15), worth 6 points each
- 3 written problems (16-18), worth 10 points each unless noted

Please make sure nothing is missing from your exam.

- No calculators!
- For the true/false and multiple choice questions, mark your answer on the answer card.
- Show all your work for the written problems. Your ability to make your solution clear will be part of the grade. Furthermore, wrong answers are more likely to receive partial credit if your work is clear.

Useful Formulas

$\sin(a + b) = \sin(a) \cos(b) + \cos(a) \sin(b)$	$\cos(a + b) = \cos(a) \cos(b) - \sin(a) \sin(b)$
$\sin(\theta) = \cos\left(\frac{\pi}{2} - \theta\right), \cos(\theta) = \sin\left(\frac{\pi}{2} - \theta\right)$	180 degrees = π radians
$\sin^2 x + \cos^2 x = 1$	$1 + \tan^2 x = \sec^2 x$
$1 + \cot^2 x = \csc^2 x$	$\tan(x) = \frac{\sin(x)}{\cos(x)}, \cot(x) = \frac{\cos(x)}{\sin(x)}$
$\sec(x) = \frac{1}{\cos(x)}, \csc(x) = \frac{1}{\sin(x)}$	$\lim_{x \rightarrow 0} \frac{\sin(x)}{x} = 1$
$\sin(-x) = -\sin(x), \cos(-x) = \cos(x)$	$\sin(30^\circ) = \frac{1}{2}, \sin(45^\circ) = \frac{\sqrt{2}}{2}$
$\log(ab) = \log(a) + \log(b)$	$\log(a^b) = b \log a$
$\log_a c = \frac{\log_b c}{\log_b a}$	$(a^b)^c = a^{bc}$
$\frac{d}{dx} \arcsin x = \frac{1}{\sqrt{1-x^2}}$	$\frac{d}{dx} \arctan x = \frac{1}{1+x^2}$

1. If $f(x)$ is a function and $F(x)$ is an antiderivative of $f(x)$, then the height of the graph of $f(x)$ at a point is equal to the slope of the graph of $F(x)$ at that point.

- A. True
- B. False

2. If $f(x) = x^2$ on the interval $[0, 10]$, then the left endpoint Riemann sum with one subinterval, L_1 , is equal to zero.

- A. True
- B. False

3. For any two continuous functions $f(x)$ and $g(x)$:

$$\int_0^1 f(x) dx + \int_1^2 g(x) dx = \int_0^2 f(x) + g(x) dx$$

- A. True
- B. False

4. A balloon starts (at $t = 0$ seconds) with 3 liters of air in it. Over the next ten second period, air is added to the balloon at a rate of $\sqrt{1+t}$ liters per second. The final amount of air in the balloon is equal to $3 + \int_0^{10} \sqrt{1+t} dt$.
- A. True
 - B. False