BC Calculus
Review for Test # 3 (70)

61. A) Sketch the graph of a function for which $f'(x) > 0$ and $f''(x) > 0$ for all x.

B) Find the equation of f if $f''(x) = 6$, $f'(2) = 8$, and $f(2) = 6$.

62. A) A variable force given by $F = 2x - 3$ newtons is applied to an object to move it 5 meters from $x = 1$ to $x = 6$. What is the total amount of work done by the described system?

B) The velocity of a particle is given by the equation $v = t + 3 - t^{-1}$. What is the total distance traveled by the particle from $t = 1$ to $t = 5$?

63. A) Name all the locations where critical numbers are found.

B) Find the maximum and minimum value of $f(x) = x^3 + 3x^2 - 24x + 12$ on the interval $[-5, 6]$.

C) A function is continuous on the closed interval $[-2, 5]$ such that $f(-2) = -1$, $f(2) = 6$, and $f(5) = -3$. Sketch a graph of the function if f' and f'' have the properties indicated in the following table.

x	$-2 < x < 0$	$x = 0$	$0 < x < 2$	$x = 2$	$2 < x < 5$
$f'(x)$	positive	0	positive	fails to exist	negative
$f''(x)$	negative	0	positive	fails to exist	positive

What are the maximum and minimum values of the function and where do they occur?

64. Find y' if

A) $y = \arcsin\frac{x}{3}$ B) $y = \arcsin x$ C) $y = \arcsin\frac{x^2}{4}$ D) $y = \arcsin\frac{\sin x}{2}$

E) $y = \arctan\frac{x}{6}$ F) $y = \arctan x$ G) $y = \arctan\frac{6}{x}$

H) $y = \arctan\frac{x^3}{2}$ I) $y = \arctan\frac{\cos x}{3}$

Evaluate each of the following integrals.

J) $\int \frac{1}{\sqrt{4 - x^2}}\,dx$ K) $\int \frac{2}{\sqrt{9 - x^2}}\,dx$ L) $\int \frac{3}{\sqrt{10 - x^2}}\,dx$

M) $\int \frac{1}{1 + x^2}\,dx$ N) $\int \frac{6}{4 + x^2}\,dx$ O) $\int \frac{2}{8 + x^2}\,dx$

65. An object is thrown upward from the top of a tower that is 125 feet tall, with an initial velocity of 100 ft/sec.

A) How high will the object go?

B) How long will it take the object to hit the ground?

66. Integrate each of the following.

A) $\int x(x+1)\,dx$ B) $\int \frac{x+1}{x}\,dx$ C) $\int x\sqrt{x+1}\,dx$

Rewrite each of the following integrals with a change of variable.

D) $\int_0^{\pi} e^{\sin 3x}\cos 3x\ dx$ E) $\int_0^{\frac{\pi}{2}} \frac{\cos x}{\sin^3 x}\,dx$

67. A) Find the area of the region bounded by $x = 9 - y^2$ and $x = -7$.

B) Find the area of the region bounded by $x = 3 - y^2$ and $y = x - 1$.

68. Determine whether $y = \frac{x^3 - \cos x}{\tan x + \sin^2 x}$ is even, odd, or neither.

69. Integrate each of the following.

A) $\int 2x \ln x\ dx$ B) $\int x \sin 3x\ dx$ C) $\int 2x\, e^{3x}\ dx$

70. Evaluate each of the following limits.

a) $\lim_{x\to 0} \frac{1}{x}$ b) $\lim_{x\to 0} \frac{|x|}{x}$ c) $\lim_{x\to 0} \sin\frac{1}{x}$ d) $\lim_{x\to 0} \frac{4}{\sin x}$