

Instructions: \implies

If you do not read the instructions, then how will you know what to do? Read them now.

- This test is multiple-choice. You must mark your answer on the provided scantron. Before you begin, fill in all the required information on the scantron.
- Fill in the appropriate bubbles for your information and for your answers on the scantron very carefully.
- You may use one 8.5×11 inch note sheet prepared in advance. You may write on both sides of your note sheet.
- Note sheets may not be shared. If you do not bring a note sheet you will have to do without any help notes.
- You may not use any books, notebooks, additional note sheets nor note cards.
- You are expected to have a simple scientific calculator available for use on this test. Calculators and other equipment may not be shared.
- You may use a simple graphics calculator but not a laptop computer nor any device capable of extensive symbolic manipulation (other than your own brain).

Be sure to enter all required information on the scantron.

Section number: 060

There are 7 problems.

Problem 1. Consider the composition $h = f \circ g$, that is, $h(x) = f(g(x))$. If $g(0) = 1$, $g(1) = 0$, $f(0) = 3$, $f(1) = 2$, $g'(0) = 2$, $g'(1) = 4$, $f'(0) = 2$ and $f'(1) = 3$ then compute $h'(0)$.

- A.) 2 B.) 3
C.) 6 D.) 8 E.) None of the above.

\leftarrow Write letter corresponding to your answer here and mark it on the scantron (Problem 1).

Problem 2. Consider the composition $h = f \circ g$, that is, $h(x) = f(g(x))$. If $g(0) = 1$, $g'(0) = 3$, $g''(0) = 2$, $f(0) = 3$, $f'(0) = 5$, $f''(0) = 1$, $f(1) = 2$, $f'(1) = 3$, and $f''(1) = 2$, then compute $h''(0)$.

- A.) 3 B.) 6
C.) 12 D.) 24 E.) None of the above.

\leftarrow Write letter corresponding to your answer here and mark it on the scantron (Problem 2).

Problem 3. Find the slope of the tangent line at $(1, 1)$ to the curve

$$x^3 + 2x^2y - 3x + 3y^2 - 3 = 0.$$

Hint: Use implicit differentiation.

- A.) $-\frac{1}{2}$ B.) $\frac{1}{2}$
C.) -1 D.) 1 E.) None of the above.

\leftarrow Write letter corresponding to your answer here and mark it on the scantron (Problem 3).

Problem 4. A right circular cone of radius r and height h has volume $V = \pi r^2 h/3$. A right circular conical pile of sand maintains an aspect with $r = 3h/2$. If sand is being added at $1 \text{ ft}^3/\text{min}$ how rapidly is the height of the conical pile increasing when the height is 2 feet? Choose the closest number below.

- A.) 0.015 ft/min B.) 0.035 ft/min
C.) 0.050 ft/min D.) 0.095 ft/min E.) 0.115 ft/min

←Write letter corresponding to your answer here and mark it on the scantron (Problem 4).

Problem 5. The period of a simple pendulum of length l feet is given by

$$T = 2\pi \sqrt{\frac{l}{g}}$$

where g is the acceleration of gravity, about 32.1 ft/sec^2 at sea level. If we move the pendulum to a slightly higher elevation where the relative change in the acceleration of gravity is given by

$$\frac{\Delta g}{g} = -0.004$$

find the corresponding relative change $\frac{\Delta T}{T}$ in the period.

- A.) 0.001 B.) 0.002
C.) 0.003 D.) 0.004 E.) None of the above.

←Write letter corresponding to your answer here and mark it on the scantron (Problem 5).

Problem 6. A piece of wire of length 40 inches is cut into two pieces. One piece is folded into a square with edge length r . The other piece is folded into an isosceles triangle with edge length s . Find the minimum area (in square inches) enclosed by the square and by the triangle together. Choose the closest number from the list below.

- A.) 15.7 B.) 30.1
C.) 43.5 D.) 77.5 E.) 89.7

←Write letter corresponding to your answer here and mark it on the scantron (Problem 6).

Problem 7. A right circular cylindrical container of height h and radius r is to be constructed (including the circular ends) from 24π square inches of sheet metal. Find the maximum volume which can be enclosed.

- A.) 54π B.) 36π
C.) 24π D.) 16π E.) None of the above.

←Write letter corresponding to your answer here and mark it on the scantron (Problem 7).

Use this page and the backs of all the pages for scratch work.