Classroom Voting Questions: Multivariable Calculus

14.6 The Chain Rule

1. A company sells regular widgets for \$4 apiece and premium widgets for \$6 apiece. If the demand for regular widgets is growing at a rate of 200 widgets per year, while the demand for premium widgets is dropping at the rate of 80 per year, the company's revenue from widget sales is:

   (a) staying constant

   (b) increasing

   (c) decreasing

2. Suppose $R = R(u, v, w)$, $u = u(x, y, z)$, $v = v(x, y, z)$, $w = w(x, y, z)$. In the chain rule, how many terms will you have to add up to find the partial derivative of R with respect to x?

   (a) 1

   (b) 2

   (c) 3

   (d) 4

   (e) 5

3. Let $z = z(u, v)$ and $u = u(x, y, t)$; $v = v(x, y, t)$ and $x = x(t)$; $y = y(t)$. Then the expression for $\frac{dz}{dt}$ has

   (a) Three terms

   (b) Four terms

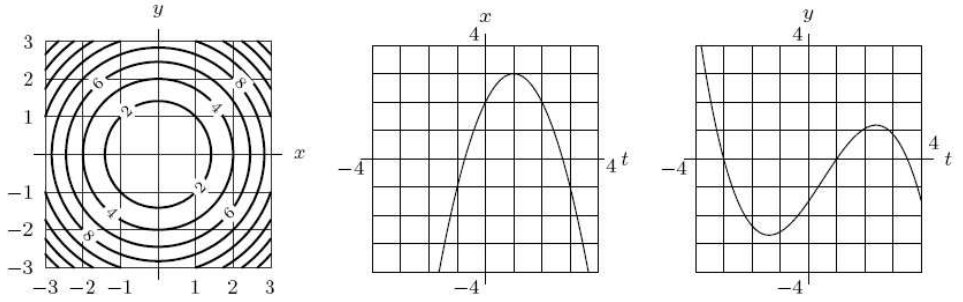
   (c) Six terms

   (d) Seven terms

   (e) Nine terms

   (f) None of the above

4. The figures below show contours of $z = z(x, y)$, x as a function of t, and y as a function of t. Decide if $\frac{dz}{dt}\big|_{t=2}$ is



(a) Positive

(b) Negative

(c) Approximately zero

(d) Can't tell without further information

5. Let $s = f(x; y; z)$ and $x = x(u; v; w)$; $y = y(u; v; w)$; $z = z(u; v; w)$. To calculate $\frac{\partial s}{\partial u}(u = 1, v = 2, w = 3)$, which of the following pieces of information do you **not** need?

I $f(1, 2, 3) = 5$

II $f(7, 8, 9) = 6$

III $x(1, 2, 3) = 7$

IV $y(1, 2, 3) = 8$

V $z(1, 2, 3) = 9$

VI $f_x(1, 2, 3) = 20$

VII $f_x(7, 8, 9) = 30$

VIII $x_u(1, 2, 3) = -5$

IX $x_u(7, 8, 9) = -7$

(a) III, IV, VII, VIII

(b) I, IV, VI, VII

(c) II, V, VI, IX

(d) I, II, VI, IX