# EMCF 14

1. $\lim\limits_{x\to 0}\dfrac{2\sin(3x)}{\sin(4x)}=$

   a. 0
   b. 3/2
   c. 3/4
   d. DNE
   e. 1
   f. None of these.

2. $\lim\limits_{x\to -1}\dfrac{x^2-1}{x^2-3x-4}=$

   a. 3/2
   b. -3/2
   c. DNE
   d. 0
   e. 2/5
   f. None of these.

3. $f(x)=x\cos(\pi x)-2x$ . Give $\lim\limits_{h\to 0}\dfrac{f(2+h)-f(2)}{h}$

   a. -2
   b. 4
   c. $2\pi$
   d. $-1$
   e. $-\pi$
   f. None of these

4. What is true of the function $f(x)=\dfrac{x^2-4}{x^2-4x+4}$ at $x=2$.

   a. There is a removable discontinuity.
   b. There is an infinite discontinuity.
   c. There is a jump discontinuity.
   d. The function is continuous, but not differentiable.
   e. The function is differentiable.
   f. None of these.

5. Give the slope of the tangent line to the graph of $f(x) = \sin(x - x^2) + (x^3 - 2)^5$ at the point where $x = 1$.

    a. 12
    b. 14
    c. 16
    d. 18
    e. 20
    f. None of these.

6. Give the rate of change of the surface area of a cube with respect to its side length when the thickness of the cube is 2.

    a. 12
    b. 14
    c. 16
    d. 18
    e. 20
    f. None of these.

7. The height and radius of an expanding right circular cylinder are always equal, and the volume of the cylinder is increasing at the rate of $1/2$ cubic inches per minute. How fast is the surface area growing when the height of the cylinder is 2?

    a. $\dfrac{10}{3\pi}$ in$^2$/min

    b. $\dfrac{5}{3\pi}$ in$^2$/min

    c. $\dfrac{5}{3}$ in$^2$/min

    d. $\dfrac{10}{3}$ in$^2$/min

    e. $\dfrac{1}{3\pi}$ in$^2$/min

    f. None of these.

8. Give the slope of the normal line to the graph of $3x^2 - 3xy + y^4 = 1$ at the point $(1,1)$.

    a. $-1/2$
    b. $1/2$
    c. $-1/3$
    d. $1/3$
    e. The normal line is vertical, so the slope is undefined.
    f. None of these.

9. A heap of rubbish in the shape of a cube is being compacted so that it retains its cubic shape. The change in the width of the cube is given by the function $\frac{dx}{dt} = -\frac{1}{t^2+1}$ in/sec, and $x = 4$ inches when $t = 2$ sec. Give the change in the volume of the cube when $t = 2$ sec.

    a.   $-28/5$ in$^3$/sec

    b.   $-38/5$ in$^3$/sec

    c.   $-38/7$ in$^3$/sec

    d.   $-48/7$ in$^3$/sec

    e.   $-48/5$ in$^3$/sec

    f.   None of these.

10. Which of the following are true?

    a.   Every function is continuous.

    b.   Every rational function is continuous at every real value.

    c.   Rational functions can have jump discontinuities.

    d.   Polynomial functions can have removable discontinuities.

    e.   The product of a polynomial and a rational function is always a polynomial.

    f.   None of these.