Kingdom of Saudi Arabia

Ministry of Higher Education

Taibah University

Department of Applied Mathematics

2nd Mid Term Examination Calculus 1- Chemistry

Time: 75 minutes

Answer the following questions

Choose the correct answer:

1. The graph of a function f has a vertical tangent line at the point $P(2, f(2))$ if f is continuous at 2 and if

   a)- $\lim_{x\to 2}|f'(x)| = \infty$ b)- $\lim_{x\to\infty}|f'(x)| = 2$ c)- $\lim_{x\to\infty}|f'(x)| = f(2)$

2. If a function f is not differentiable at a then

   a) $f'(x)$ is continuous at a b) -$f(x)$ is continuous at a c) -$f(x)$ is discontinuous at a

3. If $y = 2x^3 - 3x^2$ then $D_x y = 0$ at

   a) $x = \{0, 1\}$ b) $x = \{0, 1/2\}$ c) $x = \{1, 1/2\}$

4. The third derivative of $y = \cos 2x$ is

   a) $8 \sin 2x$ b) $8 \cos 2x$ c) $8 \tan 2x$

5. If $y = 3\,u^4 + u$ and $u = x$ then $\frac{dy}{dx}$ equal

   a) $2\,x^3 + 1$ b) $6\,x^3 + 1$ c) $12\,x^3 + 1$

Answer the following questions:

1- If $f(x) = 3x^2 - 12x + 8$ by using definition of the derivative find $f'(x)$, $f'(-1)$ and the domain of $f'(x)$

2- Use the graph of $f(x) = \sqrt{4 - x}$ to determine if f is differentiable on $[0, 4]$

3- If $y = \frac{x^2}{(x^2+2)^3}$ find $D_x y$

4- Find the slope of tangent line to the graph $x^3 - xy + y^3 - 1 = 0$ at $P(1, -1)$

5- Find the first derivative of $K(\theta) = \tan^2 3\,\theta - \csc^3 3\theta$