King Fahd University of Petroleum and Minerals
Department of Mathematical Sciences

Math 101(22 & 31) Class Test IV Fall 2016(161)

ID#:__________________ NAME:____________________________________

Question	Answer
Q1	
Q2	
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(1) The value c that satisfies the Mean-Value Theorem for $f(x) = mx^2 + rx + f$, where $m \neq 0, r, f$ are constants, on $[3, 7]$ is equal to:

a. 7 b. 5 c. 3.5 d. 4.5.

(2) If m is a positive real number and $\lim_{x\to 0} \frac{\sin^m(8x)}{\ln^m(1+4x)} = 64$, then $m =$

a. 8 b. 4 c. 6 d. 7.

(3) On the interval $(0, 2\pi)$, $f(x) = |\sin(x)\cos(2x)|$ has

a. both a local maximum and a local minimum
b. a local minimum only
c. a local maximum only
d. no local extremes.

(4) The largest interval over which f concave up for $f(x) = \sqrt[5]{x-7}$ is

a. $(-\infty, 7)$ b. $(7, \infty)$ c. $(-\infty, \infty)$ d. nowhere.

(5) The function $f(x) = e^{x^4}$ has a point of inflection with an x-coordinate of

a. $-e$ b. e c. 0 d. None exist.

(6) $\lim_{x\to 0^+} (1 - \ln 2x)^{2x} =$

a. 0 b. 1 c. $+\infty$ d. $-\infty$

(7) A 10-ft ladder rests againts a wall at $\pi/4$ radians. If it were to slip so that when the bottom of the ladder is moving at 0.02 ft/s, how fast would the ladder be moving down the wall?

a. 0.02 ft/s b. 0.0025 ft/s c. 0.015 ft/s d. 0.12 ft/s.

(8) If $y = \ln(x\sin^{-1}(x))$, then $dy/dx =$

a. $\frac{1}{x\sin^{-1}x}$ b. $\frac{\sqrt{1-x^2}}{x-\sin^{-1}x\sqrt{1-x^2}}$ c. $\frac{\frac{x}{\sqrt{1-x^2}}+\sin^{-1}x}{x\sin^{-1}x}$ d. $\frac{1}{x}$.

(9) If $x^2 - 2y^2 = 4$, then $d^2y/dx^2 =$

a. $\frac{1}{y} - \frac{x^2}{4xy^3}$ b. $2 + \frac{4x^2}{y^2}$ c. $2 + \frac{16x^2}{y^2}$ d. $2 - \frac{4x^2}{y^2}$.

(10) Using a suitable linear approximation, $(1.0002)^{500} \approx$

a. 1.01 b. 1.10 c. 1.20 d. 1.02.

(11) A particle moves in a straight line and has acceleration given by $a(t) = 2\sinh t$. Its initial velocity $v(0) = \frac{-1}{3}$ cm/s and its initial displacement is $s(0) = 0$, then $s(1) =$

a. $(2\sinh 1 - \frac{7}{3})$ cm b. $(2\cosh 1 + \frac{2}{3})$ cm
c. $(2\sinh 1 - \frac{5}{3})$ cm d. $(2\cosh 1 - \frac{2}{3})$ cm.

(12) Suppose f is continuous on $[0, 4]$, $f(0) = 1$ and $2 \leq f'(x) \leq 5$ for all x in $(0, 4)$, then

a. $7 \leq f(4) \leq 19$ b. $3 \leq f(4) \leq 6$ c. $\frac{3}{2} \leq f(4) \leq \frac{9}{4}$ d. $9 \leq f(4) \leq 21$.

(13) If $f'(x) = \frac{1}{x}(\frac{2}{x} + \frac{x}{2})^2$, then the general form of $f(x) =$

a. $\frac{2}{x^2} + (\ln|x|)^{-1} + \frac{x^2}{4} + C$ b. $\frac{-2}{x^2} - 2\ln|x| + \frac{x}{4} + C$ c. $(\frac{-2}{x^2} + \frac{x^2}{8})\ln|x| + C$
d. $\frac{-2}{x^2} + \frac{x^2}{8} + 2\ln|x| + C$.

(14) A rectangle has its base on the x-axis and its upper two vertices on the parabola $y = 12 - x^2$ What is the largest area that the rectangle can have?

a. $20\sqrt{2}$ b. 32 c. 28 d. $8\sqrt{6}$

(15) The graph of $f(x) = \frac{e^x}{e^x+1}$

a. is concave up on $(0, \infty)$ b. is concave up on $(-\infty, 0)$ c. has two inflection points d. has no inflection points

TAKE HOME CLASS TEST (You Must Provide a Detail Solution)

(*1) $f(x) = 3x^2 - 4x + 2$ has an absolute maximum on $[-2, 2]$ of

a. 16 b. 22 c. 12 d. 4π.

(*2) $f(x) = \sin^2(x)$ on $0 < x < 2\pi$ has

a. both a local maximum and a local minimum

b. a local minimum only

c. a local maximum only

d. neither a local maximum nor a local minimum.

(*3) $\lim\limits_{x\to 0^+} \frac{\cos(\frac{1}{x})\sin(\frac{1}{x})}{\cos(\frac{2}{x})} =$

a. 0 b. $\frac{1}{2}$ c. $+\infty$ d. DNE.

(*4) Find the value of k, if possible, that will make the function continuous.

$f(x) = \begin{cases} x + 2k, & x \leq 1 \\ kx^2 + x + 1, & x > 1 \end{cases}$

a. 1 b. -1 c. 2 d. None exist.

(*5) The displacement of a particle, if $v(t) = \cos t$; $[0, \pi]$, is equal to:

a. 0 b. 1 c. 2 d. 2π.

(*6) If $y = \tan^{-1}(\frac{1-\cot x}{1+\cot x})$, then $y' =$

a. 1 b. 2 c. $\csc^2 x$ d. $\frac{2}{1+\csc^2 x}$

(*7) The asymptotes of the graph of the function $f(x) = \frac{x^4-x^3-2x^2}{x^3+x^2+x+1}$ are

a. one slant asymptote and no other asymptotes. b. one slant, one horizontal, and one vertical asymptotes. c. one slant and two vertical asymptotes. d. one slant and three vertical asymptotes.

(*8) If $y = M$ and $y = R$ are the equations of the horizontal asymptotes to the graph of the function $f(x) = \frac{\pi}{2} - \cos^{-1}(\frac{x+1}{\sqrt{4x^2+1}})$, then $M + R =$

a. $\frac{\pi}{6}$ b. $\frac{-\pi}{6}$ c. $\frac{3\pi}{4}$ d. 0

(*9) $[\cosh(\frac{2x}{3}) + \sinh(\frac{2x}{3})]^{3/4} =$

a. $e^{3x/2}$ b. $\sqrt{e^x} - \sqrt{e^{-x}}$ c. $\sqrt{e^x}$ d. $\frac{1}{2}e^{3x/2}$

(*10) If the edge of a cube was found to be 30 cm with possible error in measurement of 0.1 cm; then the estimated percentage error in the surface area of the cube is

a. $\frac{5}{6}\%$ b. $\frac{2}{3}\%$ c. $\frac{1}{6}\%$ d. $\frac{1}{3}\%$

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