King Fahd University of Petroleum & Minerals

Department of Mathematics & Statistics

Math 101 (17) Class Test III Spring 2017 (162)

ID#:________________ NAME:______________________________

Serial#________________

---

1. Which of the following statements is **TRUE**:

   a) If f is a differentiable and positive function, then $\frac{d}{dx}[\sqrt{f(x)}] = \frac{f'(x)}{2\sqrt{f(x)}}$

   b) If $y = \sin^2 x$, then $y'' = 2\sin x \cos x$

   c) If $y = e^2$, then $y' = 2e$

   d) $\frac{d}{dx}\ln(10) = \frac{1}{10}$

   e) $\frac{d}{dx}(|x^2 + x|) = |2x + 1|$

2. If $y = \dfrac{4\sin x}{2x + \cos x}$, then $y' =$

3. $\lim\limits_{h \to 0} \dfrac{\sin(2x + h) - \sin(2x)}{h} =$

4. A particle with position function $s(t) = t^3 - 3t^2 - 9t$, $t \in [0, 7]$, moves in the positive direction when $t \in (a, b)$. Then $a + b =$

5. An equation of the tangent line to the curve $y = \dfrac{\ln x}{x}$ at $(1, 0)$ is

6. The slope of the tangent line to the curve $x^2 + x^2 y^2 + \tan^{-1} y = 1$ at the point $(-1, 0)$ is

7. If $h(2) = 4$ and $h'(2) = -3$, then $\dfrac{d}{dx}\left(\dfrac{h(x)}{x}\right)\Bigg|_{x=2}$ is equal to:

8. $\displaystyle\lim_{x \to \pi} \frac{\sin(\sin x)}{\tan x} =$

9. Let $f(x) = x^n e^x$, where n is a positive integer. Then, $f^{(n)}(x)$ at $x = 0$ is

10. If $f(x) = x\, g(x)$, where f and g are differentiable functions, $f(2) = -6$, and $f'(2) = -5$. The equation of the normal line to the curve $y = g(x)$ at $x = 2$ is

11. Given that $y = \dfrac{e^x \cos(\pi x)}{\sqrt{x}} + e^x$, then $y'(1) =$

12. If $f(t) = g(t\,g(t^2))$ such that

t	2	4	8
$g(t)$	2	4	3
$g'(t)$	1	2	2

,

then $f'(2) =$

13. $\dfrac{d}{dx}\left[\lim_{n\to\infty}\left(1+\dfrac{x}{5n}\right)^n\right]=$

14. Let $g(x) = \begin{cases} \sqrt{x}\,e^x \ \text{ when } & x \geq 0 \\ \log_3(-x) \ \text{ when } & x < 0 \end{cases}$. The value of $g'(1) + g'\left(\dfrac{-1}{\ln 3}\right)$ equals to

15. Let $f(x) = c\,x^2 + c\,\ln\left(|\cos x|\right) + 3$, where c is some constant. The value of c making $f'(\pi) = \dfrac{3\pi}{2}$ is

16. If $f(x) = 5x + 3\,e^{7x}$, then $\left(f^{-1}\right)'(3) =$

17. A glass window has a shape of square with a semicircle on its top. Suppose that the area of the square is changing at the rate of $\frac{2}{\pi}\,\text{cm}^2/\text{min}$. Then the area of the semicircle will be changing at the rate of $R\,\text{cm}^2/\text{min}$ where $R =$

18. If $y = x\sin^{-1} x + \sqrt{1-x^2}$, then $\frac{dy}{dx}$ at $x = 1$ equals to

19. If $f(x) = (\pi\, x)^{ex}$, then $f'\left(\frac{1}{\pi}\right) =$

20. $\frac{d^{19}}{dx^{19}}(x\,\sin x) =$

Dr. M. R. Alfuraidan