King Fahd University of Petroleum and Minerals
Department of Mathematics & Statistics
Math 101(07 & 12) Class Test III Summer 2018(173)

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1. If $y = 3^{\sqrt{x}} + (\sqrt{x})^3$, then $y'(1) =$.
2. Let $f(x) = \frac{4!}{ax+1}$, where a is a nonzero constant. If $f^{(5)}(0) = -(4!)^2$, then $a^5 =$
3. If c is the number satisfying the conclusion of the Mean Value Theorem for $f(x) = -4 + \sqrt{3x+1}$ on the interval $[1, 5]$, then $c =$
4. Which of the following statements is **TRUE** about the graph of the function $f(x) = x^2 - 18\ln x$?
   (a) The graph has one inflection point.
   (b) The graph is concave upward on $(0, 3)$.
   (c) The graph is concave downward on $(3, \infty)$.
   (d) The graph is increasing on $(0, 3)$.
   (e) The graph is decreasing on $(3, \infty)$.
5. The function $f(x) = 3\cos x - \cos^3 x$, $0 < x < \frac{5\pi}{3}$, has ..... **critical points**.
6. The asymptotes of the function $f(x) = \frac{x^7 - x^6 - 2x^2}{x^6 + x^4 + x^2 + 1}$ are
7. $\lim\limits_{h\to 0} \frac{\tan^{-1}(2x+h) - \tan^{-1}(2x)}{h} =$.
8. 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 $b^a =$.
9. If $h(2) = \sqrt{2}$ and $h'(2) = -\sqrt{2}$, then $\frac{d}{dx}\left(\frac{h(x^2)}{x^2}\right)\Big|_{x=\sqrt{2}}$ is equal to
10. $\lim\limits_{x\to\pi} \frac{\sin x}{\sin(\sin x)} =$
11. If $f(x) = xg(x)$, where f and g are differentiable function, $f(2) = -6$ and $f'(2) = -5$. The equation of the tangent line to the curve $y = g(x)$ at $x = 2$ is
12. Let $f(x) = \begin{cases} \sqrt{x}e^x, & \text{when } x \geq 0; \\ \log_4(-x), & \text{when } x < 0. \end{cases}$ The value of $f'(1) + f'(\frac{-1}{\ln 4})$ equal to
13. If $f(x) = 5x + 3e^{7x}$, then $(f^{-1})'(3) =$

14. If $f(x) = (ex)^{\pi x}$, then $f'(\frac{1}{e}) =$

15. $\frac{d^{21}}{dx^{21}}(x \cos x) =$

16. 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 $\frac{2}{e}\ cm^2/min$. Them the area of the semicircle will be changing at the rate of $R\ cm^2/min$, where $R =$

17. If $x_1 = 1$ is an approximation to the real root of the equation $x^3 + 5x - 7$, then the next approximation x_2 given by Newton's Method is

18. If $f'(x) = (x - \frac{1}{\sqrt{x}})^2$ and $f(1) = 1$, then $f(4) =$

19. If $y = (3x + 1)^{5/2}\sqrt{\frac{2x+2}{x^2+3}}$, then $y'(1) =$

20. The linearization $L(x)$ of $f(x) = (7 - 3x)^{2/3}$ at $a = 1$ is

21. If $y = L$ and $y = M$ are the equations of the horizontal asymptotes to the graph of the function $f(x) = \frac{\pi}{2} - \cos^{-1}(\frac{\sqrt{3x^2+1}}{2x+1})$, then $L + M =$

22. $\Big[\cosh(\frac{3x}{2}) + \sinh(\frac{3x}{2})\Big]^{4/3} =$

23. $\frac{d}{dx}\Big[2x \sinh(3x) + 2x \sin^{-1} x + \frac{2x}{\sqrt{1-x^2}}\Big] =$

24. If $x^2 + y^3 = 10$, then $\frac{d^2y}{dx^2}|_{(x,y)=(3,1)} =$

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