King Fahd University of Petroleum and Minerals
Department of Mathematics & Statistics
Math 101(17) Class Test II Spring 2017(162)

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(1) Find y' of each of the following:

(a) $y = \frac{\frac{1}{x}}{1-e^{\frac{1}{x}}}$.

(b) $y = \sqrt[x]{\tan\sqrt{x}}$.

(c) $\sin\frac{x}{y} = x^2 - y$.

(d) $y = (\frac{4}{x} + \frac{1}{x^{-5}})^{\frac{-1}{2}} + x^{\ln 2}$

(e) $y = \sec^2(\log_4 x^4)$.

(f) $y = \sqrt{\sin(7x + \sqrt{\cot 5x})}$.

(g) $y = \cos^{-1}(\frac{x+1}{x-1}) + \cot^{-1}(\ln \sqrt{x})$, $x > 0$.

(2) Find the number of points at which the curve $y = x^3 - 3x^2 + 4$ has tangent lines parallel to the line $3x + y = 2$.

(3) Suppose f is a differentiable function such that $f(g(x)) = \sqrt{x}$ and $f'(x) = 1 + [f(x)]^2$. Find $g'(x)$.

(4) (a) For what values of x is the function $f(x) = |x^2 - x|$ differentiable? Find a formula for f'. (b) Sketch the graphs of f and f'.

(5) If f is differentiable at a, where $a > 0$, evaluate the following limit in terms of $f'(a)$.

$$\lim_{x \to a} \frac{f(x)-f(a)}{\sqrt{x}-\sqrt{a}}.$$

(6) Find $\lim_{h \to 0} \frac{f(x+h)-f(x)}{h}$ for $f(x) = 2^x x^2$.

(7) Find $\frac{df^{-1}}{dx}|_{x=-2}$ if $f(x) = 1+2x-x^2$, $x \leq 1$ without evaluating the inverse function $f^{-1}(x)$.

(8) Find y'' if $y = 5x^5 - y^5 - 1$.