Name_____ Date_____ Obscure Constellation_____

AB Calculus TEST: 2.1 - 2.6, NO CALCULATOR

Part Eins: Vielen choices—Put the correct CAPITAL letter in the space to the left of each question.

_____1. If $f(x)=(x-1)(x^2+2)^3$, then $f'(x)=$

(A) $6x(x^2+2)^2$ (B) $6x(x-1)(x^2+2)^2$ (C) $(x^2+2)^2(x^2+3x-1)$

(D) $(x^2+2)^2(7x^2-6x+2)$ (E) $-3(x-1)(x^2+2)^2$

_____2. In the *xy*-plane, the line $x+y=k$, where *k* is a constant, is tangent to the graph of $y=x^2+3x+1$. What is the value of *k*?

(A) -3 (B) -2 (C) -1 (D) 0 (E) 1

_____3. $\frac{d}{dx}\left[\cos^2(x^3)\right]=$

(A) $6x^2\sin(x^3)\cos(x^3)$ (B) $6x^2\cos(x^3)$ (C) $\sin^2(x^3)$ (D) $-6x^2\sin(x^3)\cos(x^3)$ (E) $-2\sin(x^3)\cos(x^3)$

_____4. An equation of the line tangent to the graph of $y=\frac{2x+3}{3x-2}$ at the point $(1,5)$ is

(A) $13x-y=8$ (B) $13x+y=18$ (C) $x-13y=64$ (D) $x+13y=66$ (E) $-2x+3y=13$

_____5. If *u*, *v*, and *w* are nonzero, differentiable functions, then the derivative of $\frac{uv}{w}$ is

(A) $\frac{uv'+u'v}{w'}$ (B) $\frac{u'v'w-uvw'}{w^2}$ (C) $\frac{uvw'-uv'w-u'vw}{w^2}$ (D) $\frac{u'vw+uv'w+uvw'}{w^2}$ (E) $\frac{uv'w+u'vw-uvw'}{w^2}$

_____6. If $y=x^2\sin(2x)$, then $\frac{dy}{dx}=$

(A) $2x\cos(2x)$ (B) $4x\cos(2x)$ (C) $2x\left[\sin(2x)+\cos(2x)\right]$

(D) $2x\left[\sin(2x)-x\cos(2x)\right]$ (E) $2x\left[\sin(2x)+x\cos(2x)\right]$

_____7. The $\lim_{h\to 0}\frac{\tan 3(x+h)-\tan 3x}{h}$ is

(A) 0 (B) $3\sec^2(3x)$ (C) $\sec^2(3x)$ (D) $3\cot(3x)$ (E) nonexistent

_____8. If $y=2\cos\left(\frac{x}{2}\right)$, then $\frac{d^2y}{dx^2}=$

(A) $-8\cos\left(\frac{x}{2}\right)$ (B) $-2\cos\left(\frac{x}{2}\right)$ (C) $-\sin\left(\frac{x}{2}\right)$ (D) $-\cos\left(\frac{x}{2}\right)$ (E) $-\frac{1}{2}\cos\left(\frac{x}{2}\right)$

_____9. If $y=\tan x-\cot x$, then $\frac{dy}{dx}=$

(A) $\sec x\csc x$ (B) $\sec x-\csc x$ (C) $\sec x+\csc x$ (D) $\sec^2 x-\csc^2 x$ (E) $\sec^2 x+\csc^2 x$

Part Los Dos: Frei Response.

10. (1990 AB/BC-1) An elephant starts at time $t = 0$ seconds and moves along the *y*-axis so that its position at any time $t \geq 0$ is given by $y(t) = (t-1)^3(2t-3)$ feet.
    (a) Find the velocity of the elephant, $v(t)$, for any time $t \geq 0$.
    (b) For what values of *t* is the elephant moving down? Justify.
    (c) Find the value of *t* when the elephant is moving and his acceleration is zero.