College of Sciences	King Fahd University of Petroleum & Minerals	Department of Mathematical Sciences	
Name: KEY	**Quiz-4 Form A MATH 101**	**ID:** KEY	SEC: **11** **28**

(Success is a Journey). Say a prayer and START

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1) Use local linear approximation to approximate $(3.02)^4$. (let $x_0 = 3$).

Form A

(a) 83.16 b) 83.1817 c) 84.2889

Form B

(d) 84.24 e) 81

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2) A spherical balloon is inflated so that its volume is increasing at the rate of $8\pi\ m^2/min$. How fast is the radius of the balloon increasing when the radius is 2 m? (Volume of sphere $= \frac{4}{3}\pi r^3$ when r = radius).

Form A Form B

(a) $\frac{1}{2}$ (b) 4 c) 1 d) $\frac{1}{4}$ e) 2

(1) $f(x) = x^4$ $f(3) = 81$

$f'(x) = 4x^3$ $f'(3) = 108$

$l(x) = 81 + 108(x-3)$

Form A

$l(3.02) = 81 + 108(0.02)$

$= 81 + 2.16 = 83.16$

Form B

$l(3.03) = 81 + 108(0.03)$

$= 81 + 3.24$

$= 84.24$

(2) $V(t) = \frac{4}{3}\pi r^3 \Rightarrow \frac{dV}{dt} = \frac{4}{3}\pi(3)r^2\frac{dr}{dt}$

$\boxed{\frac{dV}{dt} = 4\pi r^2 \frac{dr}{dt}}$

$\frac{dV}{dt} = 8\pi$, $r = 2 \Rightarrow 8\pi = 4\pi(2)^2\frac{dr}{dt}$

$\Rightarrow \frac{dr}{dt} = \frac{1}{2}$ Form A

Form B:

$\frac{dV}{dt} = 16\pi$, $r = 1 \Rightarrow 16\pi = 4\pi\frac{dr}{dt} \Rightarrow \frac{dr}{dt} = 4$

3) Find $\frac{dy}{dx}$.

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

$$y' = -\frac{(e^x)'}{e^x\sqrt{(e^x)^2-1}}$$

$$= -\frac{e^x}{e^x\sqrt{e^{2x}-1}}$$

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$$= \frac{-1}{\sqrt{e^{2x}-1}}$$

(b) $y = x^2(\sin^{-1}x)^3$

$$y' = 2x(\sin^{-1}x)^3 + 3(\sin^{-1}x)^2\left[\sin^{-1}x\right]' \cdot x^2$$

$$= 2x(\sin^{-1}x)^3 + \frac{3x^2(\sin^{-1}x)^2}{\sqrt{1-x^2}}$$

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