Math101 -- **Quiz#5&6**

Solution's Key

Name:

Solve and then select the correct answer:

Serial No:

1.	The equation of the tangent line to the curve $y = 2\tan\left(\frac{\pi x}{4}\right)$ at $x = 1$ is (a) $y = x + \frac{\pi}{4}$ ➡ (b) $y = \pi x + 2 - \pi$ (c) $y = -\pi x + 2 + \pi$ (d) $y = \frac{\pi}{4}x + 2 - \frac{\pi}{4}$ (e) $y = 3\pi x + 2 - 3\pi$
2.	Let $f(x) = 1 + 2x - x^2$, $x \leq 1$. Then $\frac{df^{-1}}{dx}\Big\|_{x=-2} =$ ➡ (a) $\frac{1}{4}$ (b) $\frac{1}{6}$ (c) $\frac{1}{3}$ (d) $-\frac{1}{4}$ (e) -1
3.	If $y = x^y$, then $y' =$ (a) $\frac{xy}{y + \ln x}$ ➡ (b) $\frac{y^2}{x - xy\ln x}$ (c) x^{y-1} (d) $\frac{x^2}{x + y\ln x}$ (e) $\frac{y}{x - y}$

4.	The radius of a sphere was measured to be $20\,cm$ with a possible error in measurement of at most $0.05\,cm$. The maximum error in the computed volume of the sphere is approximately equal to (a) $10\,\pi\ cm^3$ (b) $20\,\pi\ cm^3$ (c) $60\,\pi\ cm^3$ (d) $40\,\pi\ cm^3$ ➡ (e) $80\,\pi\ cm^3$
5.	If $y = \left(\dfrac{1+e^u}{e^u}\right)^2$ and $u = \dfrac{1+x}{x}$, then the value of $\dfrac{dy}{dx}$ when $x = 1$ is equal to (a) 0 (b) $-2(e^{-2}+1)$ (c) e^2+e ➡ (d) $2(e^{-2}+e^{-4})$ (e) $-2\,e^{-2}$
6.	The slope of the tangent line to the curve $\sin(x+y) = xy$ at the point $(0,0)$ is ➡ (a) -1 (b) 53 (c) 0 (d) -2 (e) 1

7.	The area of a circle is decreasing at a rate of $\frac{8\pi}{9}\, cm^2/min$. At what rate is the radius of the circle changing when the area is $\frac{\pi}{9}\, cm^2$? (a) $\frac{4}{3}\; cm/min$ ➡ (b) $\frac{-4}{3}\; cm/min$ (c) $-2\,\pi\; cm/min$ (d) $-2\; cm/min$ (e) $2\,\pi\; cm/min$
8.	If $y = x^2\sin^{-1}(x^2) + \sqrt{1-x^4}$, then $y' =$ ➡ (a) $2x\sin^{-1}(x^2)$ (b) $2x\sin^{-1}(x^2) + \frac{4x}{\sqrt{1-x^4}}$ (c) $x\sin^{-1}(x^2) + \frac{4x^3}{\sqrt{1-x^4}}$ (d) $\sin^{-1}(x^2) - \frac{2x^3}{\sqrt{1-x^4}}$ (e) $2x\sin^{-1}(x^2) - \frac{2x}{\sqrt{1-x^4}}$
9.	A man 2 m tall walks directly away from a street light that is 8 m high at the rate of $\frac{3}{2}$ m/sec. How fast is the length of his shadow changing? (a) $\frac{9}{2}\; m/sec$ (b) $\frac{3}{2}\; m/sec$ ➡ (c) $\frac{1}{2}\; m/sec$ (d) $3\; m/sec$ (e) $\frac{1}{3}\; m/sec$

10. The linearization of $f(x) = e^{\tan^{-1}(3x)}$ at $x = 0$ is given by

(a) $L(x) = 3 - x$

(b) $L(x) = 3x$

(c) $L(x) = 1 - 2x$

(d) $L(x) = 2 + x$

(e) $L(x) = 1 + 3x$

11. The edge of a cube increases at a rate of $3\,cm/s$. When the edge length is $2\,cm$, the rate at which the **surface area** of the cube is increasing is

(a) $40\,cm^2/s$

(b) $72\,cm^2/s$

(c) $12\,cm^2/s$

(d) $36\,cm^2/s$

(e) $84\,cm^2/s$

12. Using a suitable linear approximation, the value of $\ln(1.02)$ is approximated by

(a) 0.02

(b) 0.01

(c) 1.02

(d) 1.01

(e) 0.04