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

Name:

Solve and then select the correct answer:

Serial No:

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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 $\frac{df^{-1}}{dx}|_{x=-2} =$

   (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