CALCULUS I – Worksheet #53

1. A sphere of radius 6 cm is to be constructed. If the radius is made 0.01 cm too short, what is the approximate error made in the surface area of the sphere? ($S = 4\,p\,r^2$)
   (A) $-24p$ (B) –0.06 (C) $-0.06\,p$ (D) $-0.48\,p$ (E) –0.24

2. A circle is to be drawn with radius 4.7 inches. If the radius is measured as 4.74 inches instead, what error does this cause in the area of the circle? (Leave answer in terms of p .)
   (A) $37.6p$ in^2 (B) $0.376p$ in^3 (C) $0.0376p$ in^2 (D) $3.76p$ in^2 (E) $0.376p$ in^2

3. Approximate $\sqrt[3]{8.2}$ using differentials. (A) 2.0167 (B) 2.1667 (C) 2.0165 (D) 2.8636 (E) none

4. $f(x) = x^3 + 4x - 1$ Find dy when x changes from 3 to 3.001 using differentials.

5. $f(x) = x^3 + 4x - 1$ Approximate f(3.001) using tangent line approximations (differentials)

6. If $f(x) = x^3 + 4x - 1$, find the root using Newton's Method.
   (A) 0.246 (B) 1.062 (C) 0.460 (D) 0.258 (E) 0.247

7. Find the x–coordinates of all points of intersection of the curves $y = x^5$ and $y = 3x - 4$ using Newton's Method. (A) –1 (B) –1.714 (C) –1.573 (D) –1.538 (E) –1.540

8. What is the 50^{th} derivative of cos x? A) $-\cos x$ B) $\cos x$ C) $\sin x$ D) $-\sin x$ E) 0

9. If $f(x) = \int_1^{x^3} (t^3 - t)\,dt$, then $f\,''(1) =$ A) 18 B) 8 C) 6 D) $\frac{1}{2}$ E) 0

10. The absolute maximum of the function $f(x) = \sin x - \cos x$ on the closed interval $[0, p]$ is
    A) –1 B) $\sqrt{2}$ C) p D) $\frac{3p}{4}$ E) 0