

CALCULUS I – Worksheet #51

1. If $f(x) = x^3 + 3x$ with $x = 2$ and $dx = .01$, then find dy .

2. For problem #1, give the approximation for $f(2.01)$ using differentials.

3. Approximate $\sqrt{24.9} + (24.9)^2$ using differentials.

4. Using Newton's method, approximate the root of $f(x) = x^3 + 3x^2 - x + 4$.

5. If the radius of a sphere is drawn as 2 cm but, when measured, it was actually 2.01 cm, then approximate the change in the volume of the sphere.

6. $\int_0^{\sqrt{3}} \frac{dx}{\sqrt{4-x^2}} = ?$ A) $\frac{\ln 2}{2}$ B) $-\ln 2$ C) $\frac{p}{6}$ D) $\frac{p}{4}$ E) $\frac{p}{3}$

7. $\int (x+1) \sin x \, dx = ?$

A) $-(x-1) \cos x + \sin x + C$

B) $-(x^2/2 + x) \cos x + C$

C) $-(x+1) \cos x + \sin x + C$

D) $(x+1) \cos x - \sin x + C$

E) $x \cos x - \sin x + C$

8. The radius of a circle is increasing at a nonzero rate, and at a certain instant, the rate of increase in the area of the circle is numerically equal to the rate of increase in its circumference. At this instant what is the value of r ? A) $\frac{1}{2}$ B) 1 C) 2 D) 3 E) 4

9. Free Response Problem: Let f be the function given by $f(x) = \frac{2x-5}{x^2-4}$.

(a) Find the domain of f .

(b) Write an equation for each vertical and each horizontal asymptote for the graph of f .

(c) Find $f'(x)$.

(d) Write an equation for the line tangent to f at the point $(0, f(0))$.
