CALCULUS I – Worksheet #50

For problems 1and 2, use Newton's method to approximate the roots on the given interval to three decimal places:

1. $f(x) = x^3 + 2x - 4$ on [1,2]

2. $f(x) = x^4 - x^3 - 75$ on [3,4]

3. **Explain** why each of the following four statements say the same thing:
   i) Find the roots of $f(x) = x^3 - 3x - 1$
   ii) Find the x-coordinates of intersections of curves $y = x^3$ and $y = 3x + 1$.
   iii) Find the x-coordinates of points where the curve $y = x^3 - 3x$ crosses $y = 1$.
   iv) Find the values of x where the derivative of $g(x) = \frac{x^4}{4} - \frac{3x^2}{2} - x + 5$ equals 0.

4. Use radians to solve $\tan x = 0$ with $x_1 = 3$. (Use Newton's method)

5. Find intersection point of curves $y = \cos x$ and $y = x$. (Use Newton's method)

6. If $f(x) = \sin x + x$, use Newton's method to find x_2 given $x_0 = 1$.

7. The area that is enclosed by $y = x^3 + x^2$ and $y = 6x$ for $x \geq 0$ is
   A) $\frac{29}{12}$ B) 3 C) $\frac{16}{3}$ D) 6 E) $\frac{32}{3}$

8. f and g are functions, where f is increasing on the interval $(-\infty, \infty)$ and g is decreasing $(-\infty, \infty)$. Which of the following must be decreasing?
   (A) $f(g(x))$ (B) $g(g(x))$ (C) $f(x) - g(x)$ (D) $f(x) + g(x)$ (E) $f(f(x))$

9. $\int_0^{\frac{p}{4}} \frac{e^{\tan x}}{\cos^2 x}\,dx$ is

10. Let R be the region enclosed by the graphs of $y = e^x$, $y = x$, and the lines $x = 0$ and $x = 4$.

    a) Find the area of R.
    b) Find the volume of the solid generated when R is revolved about the x-axis.
    c) Set up, but do not integrate, an integral expression in terms of a single variable for the volume of the solid generated when R is revolved about the y-axis.