No work = no credit

1.) Approximate the integral $\int_0^2 \frac{dx}{\sqrt{4x^3+1}}$ by using by using (a.) right-hand endpoints, (b.) the

trapezoidal rule, and (c.) Simpson's rule. Use four subintervals ($n = 4$). Give your results

$$\Delta x = \frac{2-0}{4} = \frac{1}{2} \qquad \& \qquad f(x) = \frac{1}{\sqrt{4x^3+1}}$$ to 4 decimal places… the exact answer to 4 places is 1.0611

$$R_4 : \frac{1}{2} \cdot \left(f\left(\tfrac{1}{2}\right) + f(1) + f\left(\tfrac{3}{2}\right) + f(2) \right) = 0.8502$$

$$T_4 = \frac{1/2}{2} \left(1f(0) + 2f\left(\tfrac{1}{2}\right) + 2f(1) + 2f\left(\tfrac{3}{2}\right) + 1f(2) \right) = 1.0587$$

$$S_4 = \frac{1/2}{3} \left(1f(0) + 4f\left(\tfrac{1}{2}\right) + 2f(1) + 4f\left(\tfrac{3}{2}\right) + 1f(2) \right) = 1.0642$$

2.) In an effort to make the distribution of income more nearly equal, the government of a country passes a tax law that changes the Lorenz curve to $y = 0.998x^{2.6}$. Before the tax change the Gini coefficient was 0.42. Determine whether the distribution of income is more or less equitable after the tax law is passed. Interpret the result.

$$G = 2\int_0^1 x - 0.998x^{2.6}\, dx$$

$$= 2\left[\frac{x^2}{2} - \frac{0.998}{3.6}x^{3.6}\right]_0^1$$

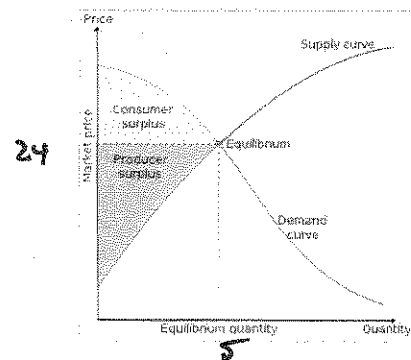$$= 2\left(\frac{1}{2} - \frac{0.998}{3.6}\right)$$

$$= 0.45$$

After the tax change, incomes are <u>less</u> equally distributed. The change had the opposite impact of its stated purpose.

3.) If the demand function for a product is $D: p = 49 - x^2$ and the supply function is $S: p = 4x + 4$. Find and interpret the consumer's and supplier's surplus.

1sc: Find equilibrium.

$$49 - x^2 = 4x + 4$$

$$\Rightarrow 0 = x^2 + 4x - 45$$

$$\Rightarrow 0 = (x+9)(x-5)$$

$$\Rightarrow x = -9 \text{ or } \boxed{x = 5}$$

$$\Rightarrow p = 24$$

2nd: Supplier's surplus

$$SS = 5(24) - \int_0^5 4x + 4\, dx$$

$$= 120 - \left[2x^2 + 4x\right]_0^5$$

$$= 120 - 70$$

$$= 50$$

Hence, producers have $50 more in hand than expected. :)