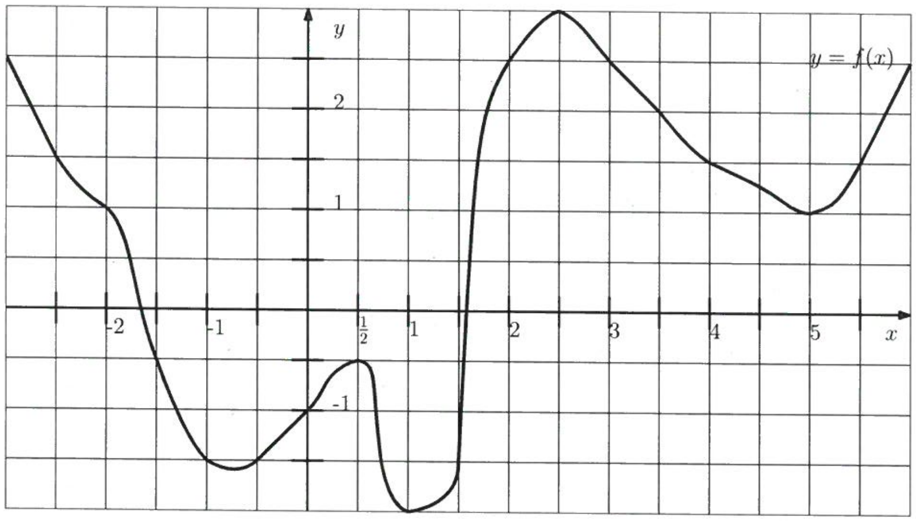
Math 1210: Quiz #9 **Fall 2017**

Name: Mick (solutions)	A#:	Section:

[7] 1. Let f be a function whose graph of $y = f(x)$ is given below. Let L_N and R_N denote the left-endpoint, respectively right end-point, Riemann sums with N subintervals of equal size. Fill in the following.



(a) Estimate the area under the curve over $[2, 5]$ by L_2: $\frac{3}{2}\left(f(2)+f(3.5)\right) = \frac{3}{2}\left(\frac{5}{2}+2\right) = 27/4$

(b) Estimate the area under the curve over $[3, 5]$ by R_4: $\frac{1}{2}\left(f(3.5)+f(4)+f(4.5)+f(5)\right) = 23/8$

(c) Estimate $\int_{-1}^{2} f(x)dx$ by L_2: $\frac{3}{2}\left(f(-1)+f(\frac{1}{2})\right) = \frac{3}{2}\left(-1-\frac{1}{2}\right) = -9/4$

(d) Estimate $\int_0^3 \left(f\left(\frac{x}{2}\right)+1\right)^2 dx$ by R_3: $\frac{3}{3}\left[\left(f(\frac{1}{2})+1\right)^2+\left(f(\frac{2}{2})+1\right)^2+\left(f(\frac{3}{2})+1\right)^2\right]$ $= 0^2+(-1)^2+(-1/2)^2 = 1+1/4 = 5/4$

(e) If $F(x) = \int_0^x f(t)dt$, then $F'(3) =$ $f(3) = 2.5$

(f) If $G(x) = \int_{-1}^{x^2} t^2 f(t+1)dt$, then $G'(x) =$ $2x^5 f(x^2+1)$

and $G'(2) =$ $64 f(5) = 64$

v9.CD

[4] 2. Solve the initial value problem $\frac{dy}{dx} = 3e^{2x}$, $y(0) = 5$.

$$y = \int 3e^{2x}\,dx = \frac{3e^{2x}}{2} + C$$

$$y(0) = \frac{3}{2} + C = 5 \text{ so } C = 5 - 3/2 = 7/2$$

Hence $y = \frac{3e^{2x}}{2} + \frac{7}{2}$

3. Compute the integral.

[5] (a) $\int \left(\sin(3x) + \frac{2}{1+x^2} + \sec^2(3x) + e^3 + x^{-3}\right) dx$

$$= \frac{-\cos(3x)}{3} + 2\tan^{-1}x + \frac{\tan 3x}{3} + e^3 x - \frac{x^{-2}}{2}$$

[4] (b) $\int_1^3 \frac{1+t^2}{t} dt = \int_1^3 (t^{-1} + t)\,dt = \left(\ln t + \frac{t^2}{2}\right)\Big|_1^3$

$$= \ln 3 + \frac{9}{2} - \ln 1 - \frac{1}{2} = \ln 3 - 4$$

v9.CD