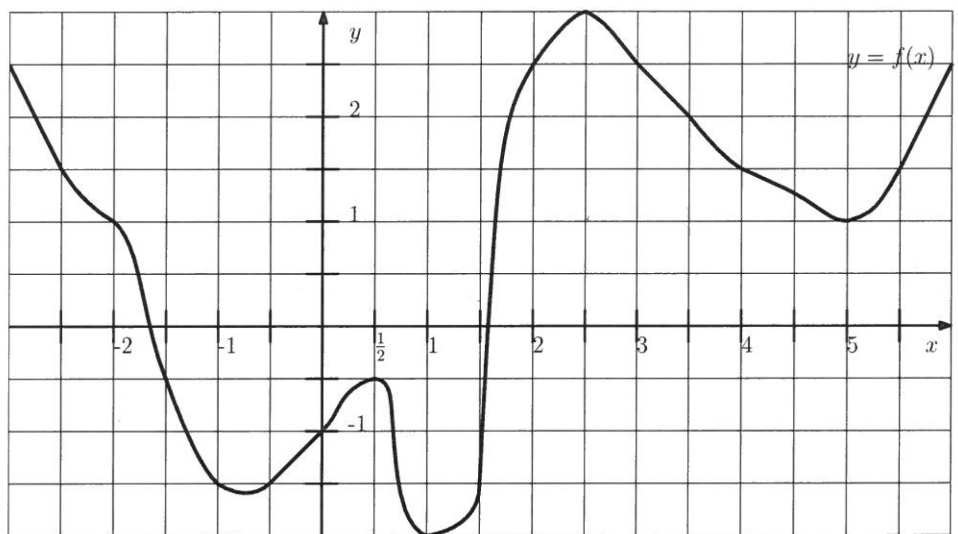
Math 1210: Quiz #9 **Fall 2017**

Name: SOLUTION	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: $\frac{3}{2}\left(\frac{5}{2}+2\right) = \boxed{\frac{27}{4}}$

(b) Estimate the area under the curve over $[2,4]$ by R_4: $\frac{2}{4}\left(3+\frac{5}{2}+2+\frac{3}{2}\right) = \boxed{\frac{18}{4}} = \boxed{\frac{9}{2}}$

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

(d) Estimate $\int_0^3 \left(f\left(\frac{x}{2}\right)+1\right)^2 dx$ by R_3: $1\cdot\left(\left(f\left(\frac{1}{2}\right)+1\right)^2+\left(f\left(\frac{2}{2}\right)+1\right)^2+\left(f\left(\frac{3}{2}\right)+1\right)^2\right) = \frac{1}{4}+1+\frac{1}{4} = \boxed{\frac{3}{2}}$

(e) If $F(x) = \int_0^x f(t)dt$, then $F'(3) =$ $f(3) = \boxed{\frac{5}{2}}$

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

and $G'(2) =$ $2(2)^5 f(5) = \boxed{64}$

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

$y = \int 3e^{2x}\,dx = \frac{3}{2}e^{2x} + C$, $4 = y(0) = \frac{3}{2}e^{0} + C \Rightarrow C = 4 - \frac{3}{2} = \frac{5}{2}$

$\therefore \boxed{y = \frac{3}{2}e^{2x} + \frac{5}{2}}$

3. Compute the integral.

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

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

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

$= \boxed{(\ln 2) + \frac{3}{2}}$