Calculus Ch4 Review

$f(x) = 6x - 3x^2$

Use this for problems 1-6

① $\int_{-2}^{1} |f(x)|\,dx$

② $\frac{d}{dx} \int_{5x^2}^{4} f(t)\,dt$

③ $v(t) = f(x)$ $\quad s(0) = 8$

Find $s(3)$ and $a(5)$

④ $\int_{0}^{2} f(x)\,dx$ Approximate area under curve with all 4 methods using 2 subintervals.

⑤ $g''(x) = f(x)$ $\quad g'(1) = 2$ $\quad g(2) = -1$

Solve the differential equation. Basically, find $g(x)$.

⑥ Find the average Value of $f(x)$ on $[0,2]$ and then at what value of x do you get the average value?

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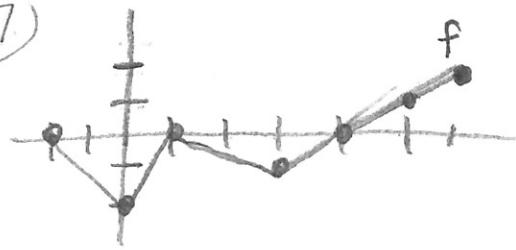
⑦



$g(x) = \int_{1}^{x} f(t)\,dt$

$g(1) =$ $\quad g(6) =$ $\quad g(-2)$

Interval $g(x)$ increasing

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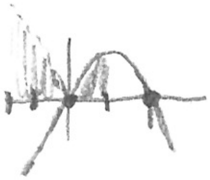
⑧ $\int \frac{5x-2}{\sqrt[3]{x}} + \sec x \tan x\,dx$

Calculus Ch 4 Review Answers

(1) $6x-3x^2=0$

$-3x(x-2)=0$

$x=0$ & 2



$$\left|\int_{-2}^{0} 6x-3x^2\,dx\right| + \left|\int_0^1 6x-3x^2\right|dx$$

$$\left|\left[3x^2-x^3\right]_{-2}^{0}\right| + \left|\left[3x^2-x^3\right]_0^1\right|$$

$$|(0)-(12+8)| + |(3-1)-(0)|$$

$$|-20| + |2| = 22$$

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(2) $$\frac{d}{dx}\left[-\int_4^{5x^2} 6t-3t^2\,dt\right] = -\left(6(5x^2)-3(5x^2)^2\right)(10x) = \boxed{-10x(30x^2-75x^4)}$$

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(3) $S(t) = 3t^2 - t^3 + c$

$8 = 3(0)^2-(0)^3+c$

$8=c$

$S(t) = 3t^2-t^3+8$

$S(3) = 3(9)-27+8$

$S(3)=8$

$a(t) = 6-6t$

$a(5) = 6-6(5) = 6-30$

$a(5) = -24$

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(4) Left $1[f(0)+f(1)] = 1[(0)+(3)] = \boxed{3}$

Right $1[f(1)+f(2)] = 1[3+0] = 3$

Midpt $1[f(.5)+f(1.5)] = 1\left[\left(3-\frac{3}{4}\right)+\left(9-\frac{27}{4}\right)\right] = 12-\frac{15}{2}$

$12-7.5$

$\boxed{4.5}$

Trap $\frac{1}{2}[f(0)+2f(1)+f(2)] = \frac{1}{2}[0+2(3)+0] = \boxed{3}$

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(5) $g'(x) = 3x^2-x^3+C$

$2 = 3(1)-1+c$

$c=0$

$g'(x) = 3x^2-x^3$

$g(x) = x^3-\frac{x^4}{4}+C$

$-1 = (2)^3-\frac{2^4}{4}+c$

$-1 = 8-4+c$

$c=-5$

$g(x) = x^3-\frac{x^4}{4}-5$

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(7) $g(1)=0$

$g(6) = -\frac{3}{2}+2 = .5$

$g(-2) = -(-3) = 3$

$g(x)$ increasing $[4, 6]$

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(8) $\int 5x^{2/3}-2x^{-1/3}+\sec x\tan x\,dx$

$3x^{5/3}-3x^{2/3}+\sec x+c$

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(6) $\frac{1}{2-0}\int_0^2 6x-3x^2\,dx$

$\frac{1}{2}\left[3x^2-x^3\right]_0^2$

$\frac{1}{2}[(12-8)-(0)] = \frac{1}{2}(4) = 2$

Average value is 2

$6x-3x^2=2$

$0=3x^2-6x+2$

$x = \frac{6\pm\sqrt{36-4(3)(2)}}{6} = \frac{6\pm\sqrt{12}}{6} = \frac{6\pm 3.5}{6}$

$= \frac{6+3.5}{6} = \boxed{\frac{9.5}{6}}$

$= \frac{6-3.5}{6} = \boxed{\frac{2.5}{6}}$

Both on interval