Homework 5-3:

① $\int_4^9 9x^2-10x+10\,dx$

$\Rightarrow 3x^3-5x^2+10x\Big]_4^9$

$3(9)^3-5(9)^2+10(9)-3(4)^3+5(4)^2-10(4)$

then ≈ 1720

② $\int_1^5 2x^{-2}-5\,dx$

$\Rightarrow -2x^{-1}-5x\Big]_1^5$

$-2(5)^{-1}-5(5)+2(1)^{-1}+5(1)\approx\frac{-92}{5}$

③ $\int_{-\pi}^{\pi} f(x)dx \begin{cases} 8x^3 & -\pi\leq x<0 \\ 9\sin x & 0\leq x\leq\pi\end{cases}$

$\int_{-\pi}^{0} 8x^3dx+\int_0^{\pi} 9\sin x\,dx$

$2x^4\Big]_{-\pi}^{0}+\left(-9\cos x\right]_0^{\pi}$

$-2(-\pi)^4-\cancel{2(0)^4}-9\cos(\pi)+9\cos(0)\Rightarrow$

$-2\pi^4+18=$ answer ?

④ $\int_3^5 \frac{4x^2+3}{x^2}dx\Rightarrow\int_3^5 4+3x^{-2}dx$

$\Rightarrow 4x-3x^{-1}\Big]_3^5$

$4(5)-3(5)^{-1}-4(3)+3(3)^{-1}\approx\frac{42}{5}$

⑤ $\int_0^1 7^{2x}dx\Rightarrow\int_0^1 49^x dx$

$\Rightarrow \frac{49^x}{\ln(49)}\Big]_0^1\Rightarrow\frac{49}{\ln(49)}-\frac{1}{\ln(49)}=\frac{48}{2\ln(7)}$

⑥ $\int_{-1}^{x}(-3t^2+2t-4)dt$; $\left[-t^3+t^2-4t\right]_{-1}^{x}$

$\Rightarrow -x^3+x^2-4x+(-1)^3-(-1)^2+4(-1)$

$\Rightarrow -x^3+x^2-4x-6$

⑦ $\int_0^1 4+x\sqrt{x}\,dx\Rightarrow\int_0^1 4+x^{3/2}dx$

$\Rightarrow 4x+\frac{2}{5}x^{5/2}\Big]_0^1\Rightarrow 4(1)+\frac{2}{5}(1)\approx\frac{22}{5}$

⑧ $\int_7^7\sqrt{2x^5+6}\,dx=0$

Same a=b then area is nonexistent duh!

⑨ $\int_{\ln 3}^{\ln 6} 6e^x dx\Rightarrow 6e^x\Big]_{\ln(3)}^{\ln(6)}$

$6(6)-6(3)=6(3)=18$

⑩ $\int_1^8 3x^{-1/2}dx\Rightarrow F(x)=6x^{1/2}\Big]_1^8$

$6\sqrt{8}-6\sqrt{1}\Rightarrow 6\sqrt{8}-6$

⑪ $\int_{-4}^{5} f(x)dx$; $\begin{cases} x & x<1 \\ 1/x & x\geq1\end{cases}$

$\Rightarrow\int_{-4}^{1}x\,dx+\int_1^5\frac{1}{x}dx\Rightarrow\frac{x^2}{2}\Big]_{-4}^{1}+\ln|x|\Big]_1^5$

$\frac{1^2}{2}\quad\frac{(-4)^2}{2}+\ln(5)-\cancel{\ln(1)}\approx\ln(5)-\frac{15}{2}$

Homework 5.3:

(12) $\int_{-1}^{1}\frac{2}{1+x^2}dx \Rightarrow 2\tan^{-1}(x)\Big]_{-1}^{1}$

$2\tan^{-1}(1)-2\tan^{-1}(-1)\approx\pi$

(13) $\int_{6}^{10} x\sqrt{4x^2+2}\,dx$

$u=4x^2+2$: $du=8x\,dx$

$\frac{1}{8}\int_{6}^{10} u^{1/2}du \to \frac{2}{3}u^{3/2}\Big]_{6}^{10}$

$\frac{1}{8}\left[\frac{2}{3}(4(10)^2+2)^{3/2}-\frac{2}{3}(4(6)^2+2)^{3/2}\right]$

using calc ≈ 524.663

(14) $\int_{5}^{11}\frac{20}{x-1}dx$; $20\int_{5}^{11}\frac{1}{x-1}dx$

$F(x)=20\ln(x-1)\Big]_{5}^{11}$

$20\ln(10)-20\ln(4)\approx 18.3258$

(15) $\int_{3}^{7}f'(t)dt=25$; $F(x)=f(x)\Big]_{3}^{7}$

$f(7)-f(3)=25$; $f(7)=25+11=36$

$f(7)=36$

(16) $f(x)=$ odd ; $\int_{-2}^{4}f(x)dx=5$ then

$\int_{2}^{4}f(x)dx=5$ also 5

(18) $f(x)=\int_{3}^{x}\left(\frac{1}{3}t^2-1\right)^{13}dt$

$f'(x)=\left(\frac{1}{3}x^2-1\right)^{13}+C$

(19) $F(x)=\int_{x}^{2}\sin(t^5)dt$; $-\int_{2}^{x}\sin(t^5)dt$

$F'(x)=-\sin(x^5)$

(20) $h(x)=\int_{-2}^{\sin(x)}\cos(t^2)+t\,dt$

$h'(x)=\cos(x)\left[\cos(\sin^2x)+\sin x\right]$

$h'(x)=\cos(x)\cos(\sin^2x)+\sin(x)\cos(x)$

(21) $g(x)=\int_{2x}^{4x}\frac{u+3}{u^2+3}du$

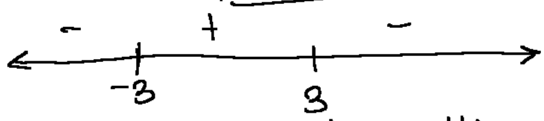
$g(x)=\int_{2x}^{0}\frac{u+3}{u^2+3}du+\int_{0}^{4x}\frac{u+3}{u^2+3}du$

$4\left[\frac{4x+3}{16x^2+3}\right]-2\left[\frac{2x+3}{4x^2+3}\right]$

(22) $f(x)=\int_{0}^{x}(9-t^2)e^{t^2}dt$

$f'(x)=(9-x^2)e^{x^2}$ when is positive

$9-x^2=0$; $\boxed{x=\pm3}$



then largest greater = [3,3]

Homeworks 3:

(23) $f(x)=\int_0^x \frac{t^2-16}{1+\cos^2(t)}\,dt$

$f'(x)=\frac{x^2-16}{1+\cos^2 x}=0\ ;\ x^2-16=0$

then value $=\pm 4$

$+ \qquad - \qquad +$

$-4 \qquad\qquad 4$

local max   local min

(24) $f(x)=\int_0^x \frac{t^2}{t^2+5t+7}\,dt$

$f'(x)=\frac{x^2}{x^2+5x+7}$; concave up?

$f''(x)=\frac{2x(x^2+5x+7)-x^2(2x+5)}{(x^2+5x+7)^2}=0$

$\Rightarrow \cancel{2x^3}+10x^2+14x-\cancel{2x^3}-5x^2=0$

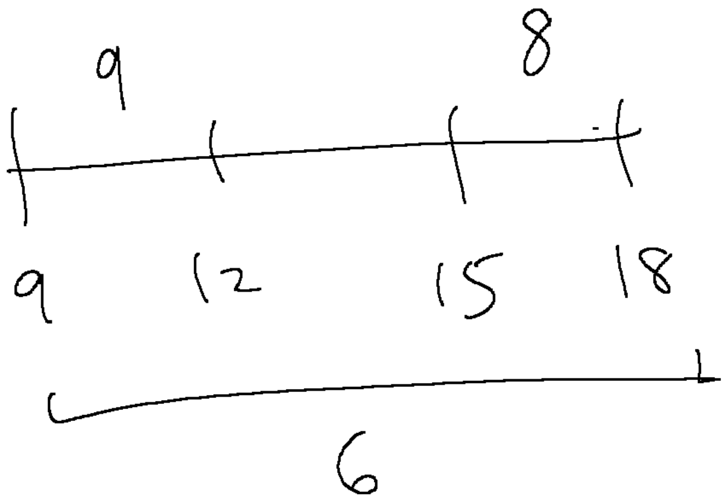
$5x^2+14x=0;\ x(5x+14)=0$

$x=0$ and $x=\frac{-14}{5}$

$+ \qquad - \qquad +$

$\frac{-14}{5} \qquad\qquad 0$

Concave Up: $(-\infty,\frac{-14}{5})\cup(0,\infty)$



$$\int_{15}^{12} 6(-11) - 9$$

$$\int_{15}^{12} (-75)$$

$$-75(12) + (75(15))$$

$$66(12) \neq 66(15)$$

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