Give the **complete definition** of the definite integral as presented in lecture. **SCORE: _____ / 4 PTS**

SEE HANDOUT ON MY WEBSITE

Use the **definition** of the definite integral and the theorem about continuous integrands to evaluate $\int_{-3}^{1} (2x-4)\,dx$. **SCORE:** _____ / 9 PTS

NOTE: 0 points if you use the Fundamental Theorem of Calculus or geometry instead.

$$\lim_{n\to\infty} \sum_{i=1}^{n} f(a+i\Delta x)\Delta x$$

$$= \lim_{n\to\infty} \sum_{i=1}^{n} f\left(-3+\frac{4i}{n}\right)\frac{4}{n} \quad (1)$$

$$= \lim_{n\to\infty} \frac{4}{n} \sum_{i=1}^{n} \left[2\left(-3+\frac{4i}{n}\right)-4\right]$$

$$= \lim_{n\to\infty} \frac{4}{n} \sum_{i=1}^{n} \left(-10+\frac{8i}{n}\right) \quad (1)\ (1)$$

$$= \lim_{n\to\infty} \frac{4}{n} \left[\sum_{i=1}^{n} -10 + \frac{8}{n}\sum_{i=1}^{n} i\right] \quad (1)$$

$$= \lim_{n\to\infty} \frac{4}{n} \left[-10n + \frac{8}{n}\frac{n(n+1)}{2}\right] \quad (1)\ (1)$$

$$= \lim_{n\to\infty} 4\left[-10+\frac{4(n+1)}{n}\right] \quad (1)$$

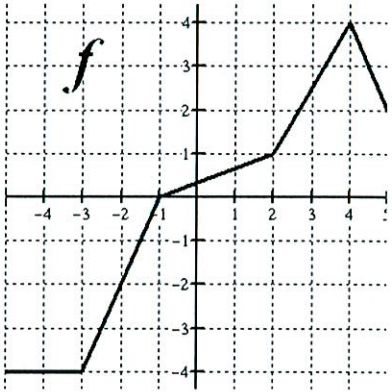
$$= 4(-10+4) \quad (1)$$

$$= -24 \quad (1)$$

REMEMBER THIS OVERRIDING RULE

The graph of function f is shown on the right.

SCORE: _____ / 7 PTS



[a] Find $\int_{-2}^{4} f(t)\,dt$.

$= \int_{-2}^{-1} f(t)\,dt + \int_{-1}^{2} f(t)\,dt + \int_{2}^{4} f(t)\,dt$

$= -\frac{1}{2}(2)(1) + \frac{1}{2}(1)(3) + \left(\frac{1+4}{2}\right)2$ (2) (1) (1)

$= -1 + \frac{3}{2} + 5$

$= \frac{11}{2}$ (1)

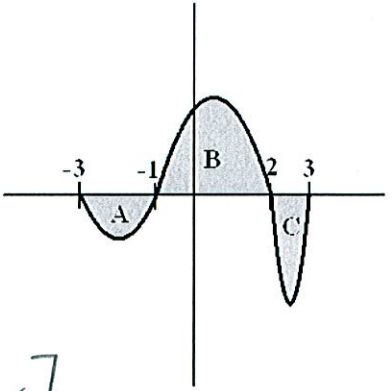
[b] Find $\int_{5}^{4} f(t)\,dt$.

$= -\int_{4}^{5} f(t)\,dt$

$= -\left(\frac{4+2}{2}\right)1 = -3$ (1) (1)

The graph of $f(x)$ is shown on the right. If the area of shaded region A is 3, the area of shaded region B is 8, and the area of shaded region C is 2, find $\int_{-3}^{3}(7-4f(x))\,dx$.

SCORE: _____ / 6 PTS



For full credit, you must clearly show the use of all necessary properties of the definite integral, Minimal credit will be given for arithmetic alone.

$= \int_{-3}^{3} 7\,dx - \int_{-3}^{3} 4f(x)\,dx$ (1)

$= 7(3--3) - 4\int_{-3}^{3} f(x)\,dx$ (1) (1)

$= 42 - 4\left[\int_{-3}^{-1} f(x)\,dx + \int_{-1}^{2} f(x)\,dx + \int_{2}^{3} f(x)\,dx\right]$ (1)

$= 42 - 4\,[-3+8-2]$ (1)

$= 30$ (1)

Sketch a region whose area is given by the expression $\lim_{n\to\infty}\sum_{i=1}^{n}\frac{2}{n}e^{-5+\frac{2i}{n}}$. Label your graph clearly.

SCORE: _____ / 4 PTS

$\Delta x = \frac{b-a}{n} = \frac{2}{n} \rightarrow b-a=2$

$f(a+i\Delta x) = f(a+\frac{2i}{n}) = e^{-5+\frac{2i}{n}}$

$a=-5 \rightarrow b=-3$

$f(x)=e^x$