Name______________________________ Date_______________ Class__________

Homework 6.3

For exercises 1 – 6, find the value of the definite integral. Show your algebraic work.

1. $\int_{-1}^{1}(t^2-t)dt = \left[\frac{1}{3}t^3-\frac{1}{2}t^2\right]\Big\vert_{-1}^{1}$ $=\left[\frac{1}{3}(1)^3-\frac{1}{2}(1)^2\right]-\left[\frac{1}{3}(-1)^3-\frac{1}{2}(-1)^2\right]$ ★ $=\left[\frac{1}{3}-\frac{1}{2}\right]-\left[-\frac{1}{3}-\frac{1}{2}\right]$ $=\left[\frac{2}{6}-\frac{3}{6}\right]-\left[-\frac{2}{6}-\frac{3}{6}\right]$ $=\left[-\frac{1}{6}\right]-\left[-\frac{5}{6}\right]$ $=4/6$ $=2/3$	2. $\int_{1}^{2}\left(\frac{3}{x^2}-1\right)dx = \int_1^2(3x^{-2}-1)dx$ $=\left[-3x^{-1}-x\right]\Big\vert_1^2$ $=\left[-\frac{3}{2}-2\right]-\left[-\frac{3}{1}-1\right]$ ★ $=\left[-\frac{3}{2}-\frac{4}{2}\right]-\left[-\frac{6}{2}-\frac{2}{2}\right]$ $=\left[-\frac{7}{2}\right]-\left[-\frac{8}{2}\right]$ $=\frac{1}{2}$
3. $\int_{1}^{4}\frac{u-2}{\sqrt{u}}du = \int_1^4\left[u^{1/2}-2u^{-1/2}\right]du$ $=\left[\frac{2}{3}u^{3/2}-4u^{1/2}\right]\Big\vert_1^4$ $=\left[\frac{2}{3}(\sqrt{4})^3-4\sqrt{4}\right]-\left[\frac{2}{3}(\sqrt{1})^3-4\sqrt{1}\right]$ ★ $=\left[\frac{2}{3}\cdot 8-8\right]-\left[\frac{2}{3}-4\right]$ $=\left[\frac{16}{3}-\frac{24}{3}\right]-\left[\frac{2}{3}-\frac{12}{3}\right]$ $=\left[-\frac{8}{3}\right]-\left[-\frac{10}{3}\right]$ $=2/3$	4. $\int_{-2}^{-1}\left(x-\frac{1}{x^2}\right)dx = \int_{-2}^{-1}\left[x-x^{-2}\right]dx$ $=\left[\frac{1}{2}x^2+x^{-1}\right]\Big\vert_{-2}^{-1}$ $=\left[\frac{1}{2}(-1)^2+\frac{1}{-1}\right]-\left[\frac{1}{2}(-2)^2+\frac{1}{-2}\right]$ ★ $=\left[\frac{1}{2}-\frac{2}{2}\right]-\left[\frac{4}{2}-\frac{1}{2}\right]$ $=\left[-\frac{1}{2}\right]-\left[\frac{3}{2}\right]$ $=-\frac{4}{2}$ $=-2$
5. $\int_{0}^{\pi}(1+\sin x)dx = \left[x-\cos x\right]\Big\vert_0^{\pi}$ $=\left[\pi-\cos\pi\right]-\left[0-\cos 0\right]$ ★ $=\left[\pi-(-1)\right]-\left[0-1\right]$ $=\left[\pi+1\right]-\left[-1\right]$ $=\pi+2$	6. $\int_{1}^{3}(3x^2+5x-4)dx$ $=\left[x^3+\frac{5}{2}x^2-4x\right]\Big\vert_1^3$ $=\left[(3)^3+\frac{5}{2}(3)^2-4(3)\right]-\left[(1)^3+\frac{5}{2}(1)^2-4(1)\right]$ ★ $=\left[27+\frac{45}{2}-12\right]-\left[1+\frac{5}{2}-4\right]$ $=\left[15+\frac{45}{2}\right]-\left[-3+\frac{5}{2}\right]$ $=15+3+\frac{45}{2}-\frac{5}{2}$ $=18+\frac{40}{2}$ $=18+20$ $=38$

Pictured is the graph of a function f. In exercises 7 – 12, find the values of each of the following definite integrals. If a value does not exist, explain why.

$A_{TRAP} = \frac{1}{2}\Delta x[f(x_1) + f(x_2)]$

$= \frac{1}{2}(3)[-3 + -2]$

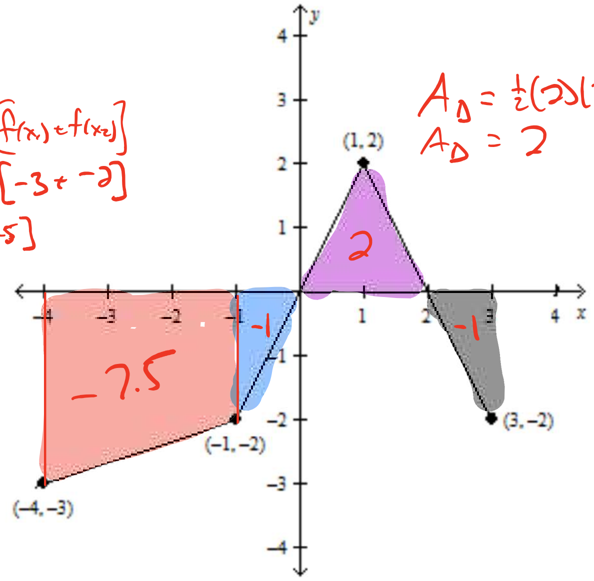
$= \frac{3}{2}[-5]$

$= -\frac{15}{2}$

$A_{TRAP} = -7.5$

$A_\Delta = \frac{1}{2}(2)(2)$

$A_\Delta = 2$



7. $\int_{-4}^{2} f(x)dx$

$= \int_{-4}^{-1} f(x)dx + \int_{-1}^{0} f(x)dx + \int_{0}^{2} f(x)dx$

$= -7.5 + -1 + 2$

$= -6.5$

8. $\int_{0}^{3} f(x)dx$

$= \int_{0}^{2} f(x)dx + \int_{2}^{3} f(x)dx$

$= 2 + -1$

$= 1$

9. $\int_{-1}^{1} f(x)dx$

$= \int_{-1}^{0} f(x)dx + \int_{0}^{1} f(x)$

$= -1 + 1$

$= 0$

10. $\int_{-4}^{0} f'(x)dx$ f is not differentiable at $x=-1$ ∴ f' is not continuous

$= \int_{-4}^{-1} f'(x)dx + \int_{-1}^{0} f'(x)dx$

$= [f(-1) - f(-4)] + [f(0) - f(-1)]$

$= [-2 - (-3)] + [0 - (-2)]$

$= [1] + [2]$

$= 3$

11. $\int_{-1}^{1} f'(x)dx = f(1) - f(-1)$

$= 2 - (-2)$

$= 4$

12. $\int_{1}^{3} f'(x)dx = f(3) - f(1)$

$= -2 - 2$

$= -4$