8. $\int_{-1}^{2}(3x^2+2)\,dx$

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

$\Delta x = \frac{2-(-1)}{n} = \frac{3}{n}$

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

$= \lim_{n\to\infty}\sum_{i=1}^{n}\left(\frac{9}{n}\left(1-\frac{6i}{n}+\frac{9i^2}{n^2}\right)+\frac{6}{n}\right)$

$= \lim_{n\to\infty}\sum_{i=1}^{n}\left(\frac{15}{n}-\frac{54i}{n^2}+\frac{81i^2}{n^3}\right)$

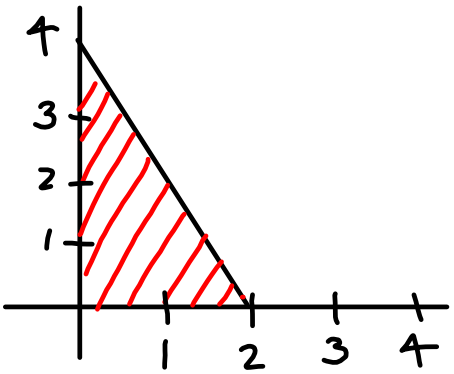
$= \lim_{n\to\infty}\left[\frac{15}{n}\sum_{i=1}^{n}1-\frac{54}{n^2}\sum_{i=1}^{n}i+\frac{81}{n^3}\sum_{i=1}^{n}i^2\right]$

$= \lim_{n\to\infty}\left(\frac{15}{n}\cdot n-\frac{54}{n^2}\cdot\frac{n(n+1)}{2}+\frac{81}{n^3}\cdot\frac{n(n+1)(2n+1)}{6}\right)$

$= 15-27+27$

$= \boxed{15}$

14. $f(x)=4-2x$



$\int_0^2(4-2x)\,dx$

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

40. $\int_2^4 x^3\,dx = 60$; $\int_2^4 x\,dx = 6$; $\int_2^4 dx = 2$

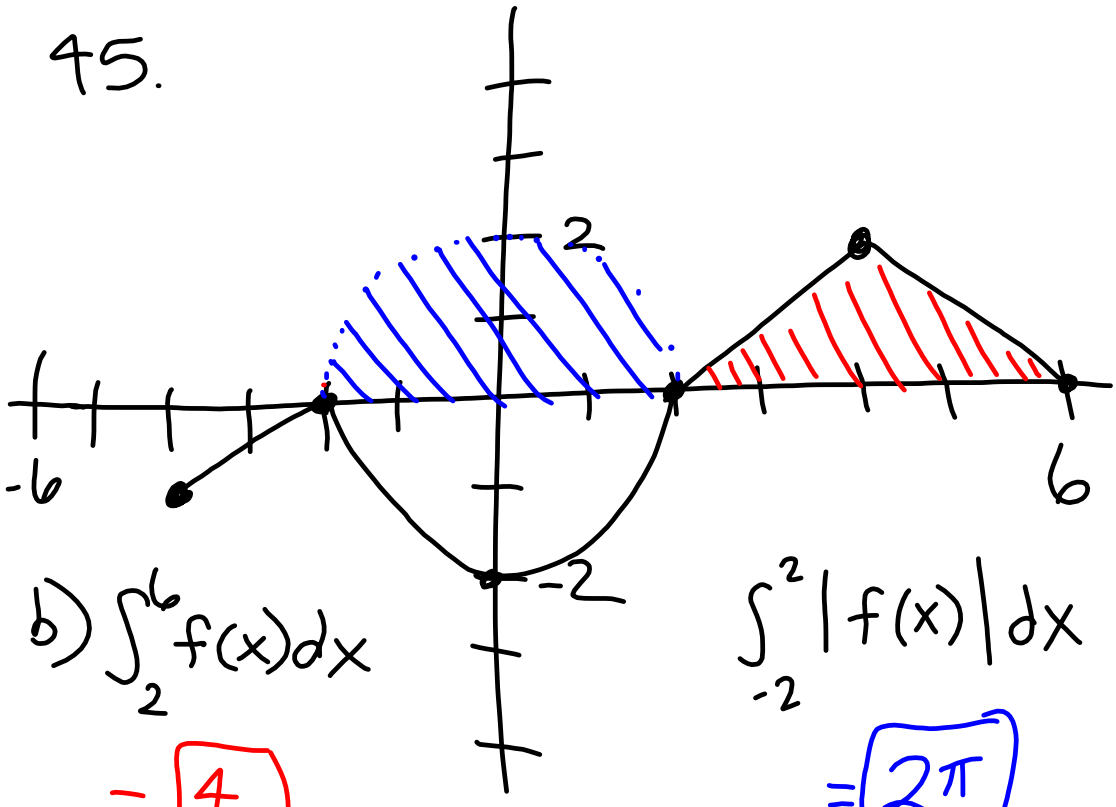
$$\int_2^4 (6 + 2x - x^3)\,dx$$

$$\int_2^4 6\,dx + \int_2^4 2x\,dx - \int_2^4 x^3\,dx$$

$$= 6\int_2^4 dx + 2\int_2^4 x\,dx - \int_2^4 x^3\,dx$$

$$= 6(2) + 2(6) - 60 = \boxed{-36}$$

45.



b) $\int_2^6 f(x)\,dx = \boxed{4}$

$\int_{-2}^{2} |f(x)|\,dx = \boxed{2\pi}$

4.4 The Fundamental Theorem of Calculus

If f is continuous on $[a,b]$ and F is antiderivative of f on $[a,b]$, then

$$\int_a^b f(x)\,dx = F(b) - F(a)$$

10. $\int_1^3 (3x^2+5x-4)\,dx$

$$= x^3 + \frac{5}{2}x^2 - 4x \Big|_{x=1}^{3} =$$

$$= 3^3 + \frac{5}{2}(3)^2 - 4(3) - \left(1^3 + \frac{5}{2}(1)^2 - 4(1)\right) =$$

$$= 27 + \frac{45}{2} - 12 - 1 - \frac{5}{2} + 4 =$$

$$= 18 + 20 = \boxed{38}$$

24. $\int_1^4 (3-|x-3|)\,dx$ $\quad \int_a^b = \int_a^c + \int_c^b$

$|x-3| = \begin{cases} x-3, & x-3 \geq 0 \\ -(x-3), & x-3 < 0 \end{cases}$ $\quad x \geq 3$, $\quad x < 3$

$= \int_1^3 (3-(-(x-3)))\,dx + \int_3^4 (3-(x-3))\,dx$

$= \int_1^3 x\,dx + \int_3^4 (6-x)\,dx = \frac{x^2}{2}\Big|_1^3 + \left(6x-\frac{x^2}{2}\right)\Big|_3^4$

$= \frac{3^2}{2} - \frac{1^2}{2} + 6(4) - \frac{4^2}{2} - \left(6(3) - \frac{3^2}{2}\right)$

$= 4 + 16 - 18 + \frac{9}{2}$

$= \boxed{\frac{13}{2}}$

32. $\int_{-\pi/2}^{\pi/2} (2t+\cos t)\,dt$

$= t^2 + \sin t \Big|_{-\pi/2}^{\pi/2} =$

$= \left(\frac{\pi}{2}\right)^2 + \sin\frac{\pi}{2} - \left(\left(\frac{-\pi}{2}\right)^2 + \sin\left(\frac{-\pi}{2}\right)\right)$

$= \sin\frac{\pi}{2} - \sin\left(\frac{-\pi}{2}\right)$

$= 1 - (-1) = \boxed{2}$

Homework for Test #1

HW#1 (submitted Mon. 11/11)

- 3.9 #5, 9; 11-19 odd; 45, 49
- 4.1 #5-33 odd; 55-61 odd; 67, 83

HW#2 (due Mon. 11/18?)

- 4.2 #7-19odd; 27-37odd; 41,43,47,53
- **4.3 #7,17,37,43,45**
- **4.4 #13, 15, 23, 31**

→NOW←

Quiz #1 ~~Wednesday~~, 11/13

Test #1 Tuesday, 11/19