

⑪ $y = x^2 - 1, [0, \sqrt{3}]$

$av(f) = \frac{1}{\sqrt{3}} \int_0^{\sqrt{3}} (x^2 - 1) dx = \frac{1}{\sqrt{3}} (0) = 0$ $x^2 - 1 = 0$
 $x = \pm 1$ at $x=1$ in the interval

⑫ $y = -\frac{x^2}{2}, [0, 3]$

$av(f) = \frac{1}{3} \int_0^3 \left(-\frac{x^2}{2}\right) dx = \frac{1}{3} \left(-\frac{9}{2}\right) = -\frac{3}{2}$ $-\frac{x^2}{2} = -\frac{3}{2}$
 $x^2 = 3$
 $x = \pm\sqrt{3}$ at $x=\sqrt{3}$ in the interval

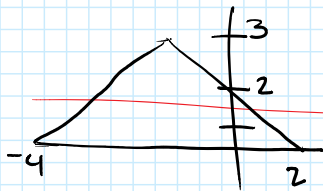
⑬ $y = -3x^2 - 1, [0, 1]$

$av(f) = \frac{1}{1} \int_0^1 (-3x^2 - 1) dx = 1(-2) = -2$ $-3x^2 - 1 = -2$
 $-3x^2 = -1$
 $x = \pm\sqrt{\frac{1}{3}}$ at $x=\frac{1}{\sqrt{3}}$ in the interval

⑭ $y = (x-1)^2; [0, 3]$

$av(f) = \frac{1}{3} \int_0^3 (x-1)^2 dx = \frac{1}{3}(3) = 1$ $\sqrt{(x-1)^2} = |x-1|$
 $x-1 = \pm 1$
 $x = 0, 2$ at $x=0, 2$ in the interval

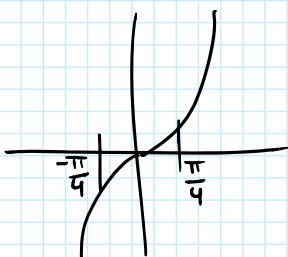
⑮ $f(x) = \begin{cases} x+4, & -4 \leq x \leq -1 \\ x+2, & -1 < x \leq 2 \end{cases}$ on $[-4, 2]$



avg = $\frac{3}{2}$

or $A = \frac{1}{2}(6)(3) = 9$
Avg val = $\frac{1}{2-(-4)}(9) = \frac{9}{6} = \frac{3}{2}$

⑱ $f(\theta) = \tan \theta, [-\frac{\pi}{4}, \frac{\pi}{4}]$



avg = 0

$\frac{1}{4}$ | $\frac{1}{4}$

(40) (a) total distance traveled = 300 miles

(b) $\text{Time} = \frac{150 \text{ mi}}{30 \text{ mi/hr}} + \frac{150 \text{ mi}}{50 \text{ mi/hr}} = 8 \text{ hours}$

(c) $\text{avg} = \frac{300 \text{ mi}}{8 \text{ hr}} = 37.5 \text{ mph}$

(d) he spent a longer time going 30 mph than 50 mph.

$$\text{avg speed} = \frac{\text{total dist traveled}}{\text{total time}} = \frac{d_1 + d_2}{t_1 + t_2} \neq \frac{1}{2} \left(\frac{d_1}{t_1} + \frac{d_2}{t_2} \right)$$