1. $\int \frac{3x^2-2x+1}{x}\,dx = \int \left(3x-2+\frac{1}{x}\right)dx = \frac{3}{2}x^2-2x+\ln|x|+C$

2. $f''(x) = 16-7x$

$f'(x) = 16x-\frac{7}{2}x^2+C \rightarrow f'(1) = 16-\frac{7}{2}+C = 2 \rightarrow \frac{25}{2}+C = \frac{4}{2}$

$C = \frac{-21}{2}$

$f'(x) = 16x-\frac{7}{2}x^2-\frac{21}{2}$

$f(x) = 8x^2-\frac{7}{6}x^3-\frac{21}{2}x+C \rightarrow f(2) = 32-\frac{28}{3}-21+C = 4$

$\frac{5}{3}+C = \frac{12}{3}$

$C = \frac{7}{3}$

$f(x) = 8x^2-\frac{7}{6}x^3-\frac{21}{2}x+\frac{7}{3}$

3. $\int_5^{17}(2x-5)\,dx \approx R_4 = \sum_{i=1}^{4} f(5+3i)(3) = 3\left[f(8)+f(11)+f(14)+f(17)\right]$

$R_4 = 3\left[11+17+23+29\right] = 240$

4. $a(t) = -32$

$v(t) = -32t$

$s(t) = -16t^2+s_0$

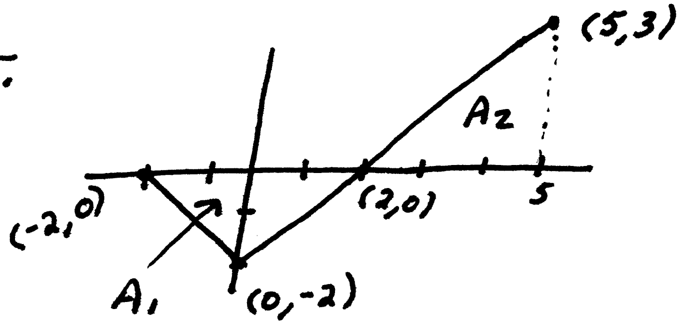
hits ground when $-32t = -360 \rightarrow t = 11.25$

$s(11.25) = 0$

$-16(11.25)^2+s_0 = 0$

$s_0 = 2025$ ft.

5.



$$\int_{-2}^{5}(|x|-2)\,dx = A_1 + A_2$$
$$= \tfrac{1}{2}(4)(-2) + \tfrac{1}{2}(3)(3)$$
$$= -\tfrac{8}{2} + \tfrac{9}{2} = \tfrac{1}{2}$$

6.
$$\int_{-2}^{5}(3x^2-x+2)\,dx = \lim_{n\to\infty}\sum_{i=1}^{n} f\left(-2+\frac{7i}{n}\right)\left(\frac{7}{n}\right)$$
$$= \lim_{n\to\infty}\frac{7}{n}\sum\left[3\left(-2+\frac{7i}{n}\right)^2-\left(-2+\frac{7i}{n}\right)+2\right] = \lim_{n\to\infty}\frac{7}{n}\sum\left[12-\frac{84i}{n}+\frac{147i^2}{n^2}+2-\frac{7i}{n}+2\right]$$
$$= \lim_{n\to\infty}\frac{7}{n}\sum\left(16-\frac{91i}{n}+\frac{147i^2}{n^2}\right)$$
$$= \lim_{n\to\infty}\frac{7}{n}\sum 16 - \frac{7}{n}\sum\frac{91i}{n} + \frac{7}{n}\sum\frac{147i^2}{n^2}$$
$$= \lim_{n\to\infty}\frac{7}{n}(16n) - \frac{637}{n^2}\sum i + \frac{1029}{n^3}\sum i^2$$
$$= \lim_{n\to\infty} 112 - \frac{637}{n^2}\left(\frac{n(n+1)}{2}\right) + \frac{1029}{n^3}\left(\frac{n(n+1)(2n+1)}{6}\right)$$
$$= \lim_{n\to\infty} 112 - \frac{637n^2+\cdots}{2n^2} + \frac{2058n^3+\cdots}{6n^3} = 112 - \frac{637}{2} + \frac{2058}{6} = 136.5$$

7. $$\sum_{i=50}^{88}(3i^3-9i^2+i) = \sum_{i=1}^{88}(3i^3-9i^2+i) - \sum_{i=1}^{49}(3i^3-9i^2+i)$$

$$= 3\left(\frac{88(89)}{2}\right)^2 - 9\left(\frac{88(89)(177)}{6}\right) + \frac{88(89)}{2} - 3\left(\frac{49(50)}{2}\right)^2 + 9\left(\frac{49(50)(99)}{6}\right) - \frac{49(50)}{2}$$

$$= 46{,}005{,}168 - 2{,}079{,}396 + 3916 - 4{,}501{,}875 + 363{,}825 - 1225 = 39{,}790{,}413$$

8. $$\int_{-1}^{6} |2x-7|\,dx = -\int_{-1}^{\frac{7}{2}}(2x-7)\,dx + \int_{\frac{7}{2}}^{6}(2x-7)\,dx$$

$$2x-7=0$$
$$2x=7$$
$$x=\tfrac{7}{2}$$

$$|2x-7| = \begin{cases} -(2x-7), & x<\frac{7}{2} \\ 2x-7, & x \geq \frac{7}{2} \end{cases}$$

$$\int_{-1}^{6}|2x-7|\,dx = -\left[x^2-7x\right]_{-1}^{\frac{7}{2}} + \left[x^2-7x\right]_{\frac{7}{2}}^{6}$$

$$= -\left[-\frac{49}{4} - 8\right] + \left[-6 - -\frac{49}{4}\right] = \frac{81}{4} + \frac{25}{4} = \frac{106}{4} = \frac{53}{2} = 26.5$$

9. $$\frac{d}{dx}\int_{5x^2}^{5} 6\sin(t^2)\,dt = -6\sin\left((5x^2)^2\right) \cdot \frac{d}{dx}(5x^2)$$

$$= -6\sin(25x^4)\,(10x)$$

$$= -60x\sin(25x^4)$$

10. $v(t) = 68.6 - 9.8t$

$68.6 - 9.8t = 0$

$t = \frac{68.6}{9.8} = 7$

$$\text{Displacement} = \int_0^{15} (68.6 - 9.8t)\,dt = \left[68.6t - 4.9t^2\right]_0^{15} = -73.5 \text{ ft}$$

$$\text{Distance} = \int_0^{7} (68.6 - 9.8t)\,dt - \int_7^{15} (68.6 - 9.8t)\,dt$$

$$= \left[68.6t - 4.9t^2\right]_0^{7} - \left[68.6t - 4.9t^2\right]_7^{15}$$

$$= \left[240.1 - 0\right] - \left[-73.5 - 240.1\right] = 240.1 + 313.6 = \boxed{553.7 \text{ ft.}}$$

11. $V_0 = 80 \frac{mi}{hr} = 80 \frac{mi}{hr}\left(\frac{hr}{3600 s}\right)\left(\frac{5280 ft.}{mi}\right) = \frac{352}{3}$ ft/s

$a(t) = \frac{-V_0}{5} = \frac{-352}{15}$

$v(t) = \frac{-352}{15}t + \frac{352}{3}$

$s(t) = \frac{-176}{15}t^2 + \frac{352}{3}t + s_0 \leftarrow$ let $s_0 = 0$ so s_5 can represent braking distance

$s(5) = \frac{-176}{15}(5)^2 + \frac{352}{3}(5) = \boxed{\frac{880}{3} = 293.\overline{3} \text{ ft.}}$