

AP Calc 3A

12. $f(x) = \sqrt[3]{x^2} + x\sqrt{x}$
 $= x^{2/3} + x^{3/2}$
 $F(x) = \frac{3}{5}x^{5/3} + \frac{2}{5}x^{5/2} + C$
 $F'(x) = x^{2/3} + x^{3/2}$
 $\boxed{= \frac{3}{5}x^{5/3} + \frac{2}{5}x^{5/2} + C}$

42. $f'''(x) = \cos x$
 $f''(x) = \sin x + C, f''(0) = 3, C = 3$
 $f'(x) = \sin x + 3$
 $f'(x) = -\cos x + 3x + C, C = 3$
 $f'(x) = -\cos x + 3x + 3$
 $f(x) = -\sin x + \frac{3}{2}x^2 + 3x + C, C = 1$
 $= -\sin x + \frac{3}{2}x^2 + 3x + 1$

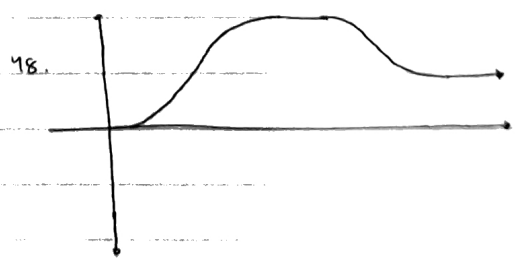
14. $g(x) = \frac{5 - 4x^3 + 2x^6}{x^6}$
 $= 5x^{-6} - 4x^{-3} + 2$
 $G(x) = -x^{-5} + 2x^{-2} + 2x + C$
 $G'(x) = 5x^{-6} - 4x^{-3} + 2$
 $\boxed{= -x^{-5} + 2x^{-2} + 2x + C}$
 $\boxed{= -\sin x + \frac{3}{2}x^2 + 3x + 1}$

44. $f'(x) = x^3$
 $f(x) = \frac{x^4}{4} + C$
 $-x = \frac{x^4}{4} + C$
 $x^3 = -1$
 $x = -1$

30. $f'(x) = 5x^4 - 3x^2 + 4$
 $f(x) = x^5 - x^3 + 4x + C$
 $(-1)^5 - (-1)^3 + 4(-1) + C = 2$
 $-4 + C = 2$
 $C = 6$
 $\boxed{x^5 - x^3 + 4x + 6}$

$\forall x \in \mathbb{R}$
 $-x - \frac{x^4}{4} = C$
 $-(-1) - \frac{(-1)^4}{4} = C$
 $C = 0.75$
 $\boxed{f(x) = \frac{x^4}{4} + \frac{3}{4}}$

36. $f''(x) = 8x^3 + 5$
 ~~$f'(x) = 2x^4 + 5x + C$~~
 $f'(x) = 2x^4 + 5x + C$
 $2(1)^4 + 5(1) + C = 8$
 $C = 1$
 $f'(x) = 2x^4 + 5x + 1$
 $f(x) = \frac{2x^5}{5} + \frac{5x^2}{2} + x + C$
 $= \frac{2}{5}x^5 + \frac{5}{2}x^2 + x + C$
 $\frac{2}{5} + \frac{5}{2} + 1 + C = 0$
 ~~$C = -\frac{39}{10}$~~
 $\boxed{= \frac{2}{5}x^5 + \frac{5}{2}x^2 + x - \frac{39}{10}}$



$$56. a(t) = 3\cos t - 2\sin t$$

$$v(t) = 3\sin t + 2\cos t + C$$

$$4 = 3\sin 0 + 2\cos 0 + C$$

$$= 0 + 2 + C$$

$$C = 2$$

$$v(t) = 3\sin t + 2\cos t + 2$$

$$s(t) = -3\cos t + 2\sin t + 2t + C$$

$$0 = -3\cos 0 + 0 + 0 + C$$

$$C = 3$$

$$s(t) = -3\cos t + 2\sin t + 2t + 3$$

$$70. a(x) = -16$$

$$v(x) = -16x + C$$

$$0 = -16x + C$$

$$\text{or } x = \frac{C}{16}$$

$$s(x) = -8x^2 + Cx + 0$$

$$s(x) = -8x^2 + Cx$$

$$200 = -8\left(\frac{C}{16}\right)^2 + C \cdot \left(\frac{C}{16}\right)$$

$$200 = -8 \frac{C^2}{16^2} + \frac{C^2}{16}$$

$$200 = -\frac{C^2}{32} + \frac{C^2}{16}$$

$$200 = \frac{C^2}{32}$$

$$C = 80 \text{ ft/s}$$

$$62. \text{ ~~balls~~$$

$$v_A = -32t + 48$$

$$v_B = -32t + 24$$

$$s_A = -16t^2 + 48t$$

$$s_B = -16t^2 + 24t$$

} Balls never pass each other except when $t=0$

$$66. p(x) = \frac{1}{\sqrt{x}} = x^{-1/2}$$

$$P(x) = \frac{1}{2} x^{1/2} = \frac{1}{2} \sqrt{x}$$

$$\frac{1}{2} \sqrt{x}$$

$$P(1) = 2$$