201 §4.9 #s 1, 6, 13, 20, 21, 26, 31, 40, 44, 45, 46

#s 1–18 Find the general antiderivative.

(1) $f(x) = x - 3 \longrightarrow \boxed{F(x) = \frac{x^2}{2} - 3x + C}$

(6) $f(x) = x(2-x)^2 = x(x^2 - 4x + 4) = x^3 - 4x^2 + 4x$

$\longrightarrow \boxed{F(x) = \frac{1}{4}x^4 - \frac{4}{3}x^3 + 2x^2 + C}$

(13) $f(u) = \dfrac{u^4 + 3u^{\frac{1}{2}}}{u^2} = u^2 + 3u^{-\frac{3}{2}} \longrightarrow$

$\boxed{F(u) = \frac{1}{3}u^3 - \frac{3}{2}u^{-\frac{1}{2}} + C}$

#s 20, 19 Find the antiderivative F of f that satisfies the condition. Check by comparing graphs of f and F

(20) $f(x) = 5x^4 - 2x^5$; $F(0) = 4$

$F(x) = x^5 - \frac{1}{3}x^6 + C$

$F(0) = C = 4 \longrightarrow \boxed{F(x) = x^5 - \frac{1}{3}x^6 + 4}$

#s 21–40 Find f.

(29) $f''(x) = 6x + 12x^2 \longrightarrow$

201 §4.9 #s 21, 26, 31, 40, 44, 45, 46

(21) cont'd

$f'(x) = 3x^2 + 4x^3 + C$

$f(x) = x^3 + x^4 + Cx + d$

(26) $f'''(t) = t - t^{\frac{1}{2}}$

$f''(t) = \frac{1}{2}t^2 - \frac{2}{3}t^{\frac{3}{2}} + C$

$f'(t) = \frac{1}{6}t^3 - \frac{2}{3}\cdot\frac{2}{5}t^{\frac{5}{2}} + Ct + d$

$= \frac{1}{6}t^3 - \frac{4}{15}t^{\frac{5}{2}} + Ct + d$

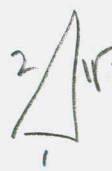
$f(t) = \frac{1}{24}t^4 - \frac{4}{15}\cdot\frac{2}{7}t^{\frac{7}{2}} + \frac{C}{2}t^2 + dt + e$

$f(t) = \frac{1}{24}t^4 - \frac{8}{105}t^{\frac{7}{2}} + \frac{1}{2}Ct^2 + dt + e$

(31) $f'(t) = 2\cos t + \sec^2 t, \ -\frac{\pi}{2} < t < \frac{\pi}{2}, \ f(\frac{\pi}{3}) = 4$

$f(t) = 2\sin t + \tan t + C$

$f(\frac{\pi}{3}) = 2\sin(\frac{\pi}{3}) + \tan(\frac{\pi}{3}) + C = 4$



$= 2(\frac{\sqrt{3}}{2}) + \sqrt{3} + C = 4 \Rightarrow$

$2\sqrt{3} + C = 4 \Rightarrow C = 4 - 2\sqrt{3}$

$f(t) = 2\sin(t) + \tan(t) + 4 - 2\sqrt{3}$

201 §4.9 #s 40, 44, 45, 46

(40) $f'''(x) = \cos(x)$, $f(0) = 1$, $f'(0) = 2$, $f''(0) = 3$

$f''(x) = \sin(x) + C$

$f''(0) = \sin(0) + C = 3 \Rightarrow f''(x) = \sin(x) + 3$

$f'(x) = -\cos(x) + 3x + d$

$f'(0) = -\cos(0) + 3(0) + d = 2 \Rightarrow$

$-1 + d = 2 \Rightarrow d = 3 \Rightarrow$

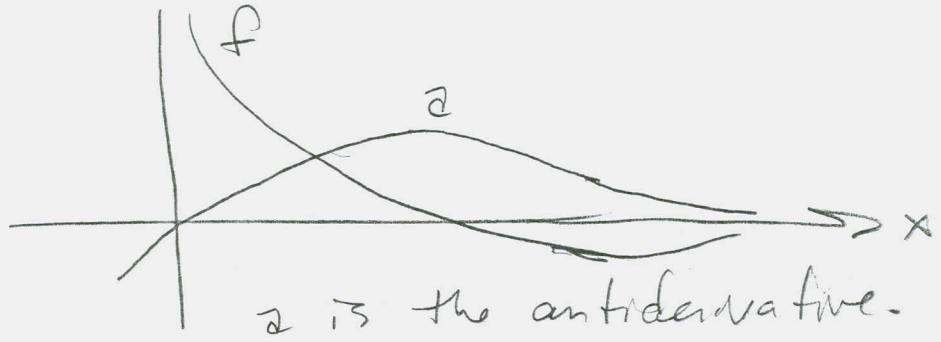
$f'(x) = -\cos(x) + 3x + 3 \Rightarrow$

$f(x) = -\sin(x) + \frac{3}{2}x^2 + 3x + K$

$f(0) = -\sin(0) + K = 1 \Rightarrow K = 1 \Rightarrow$

$$f(x) = -\sin x + \frac{3}{2}x^2 + 3x + 1$$

#44 The graph of f is shown.
Which of a, b, c is its anti derivative and why?

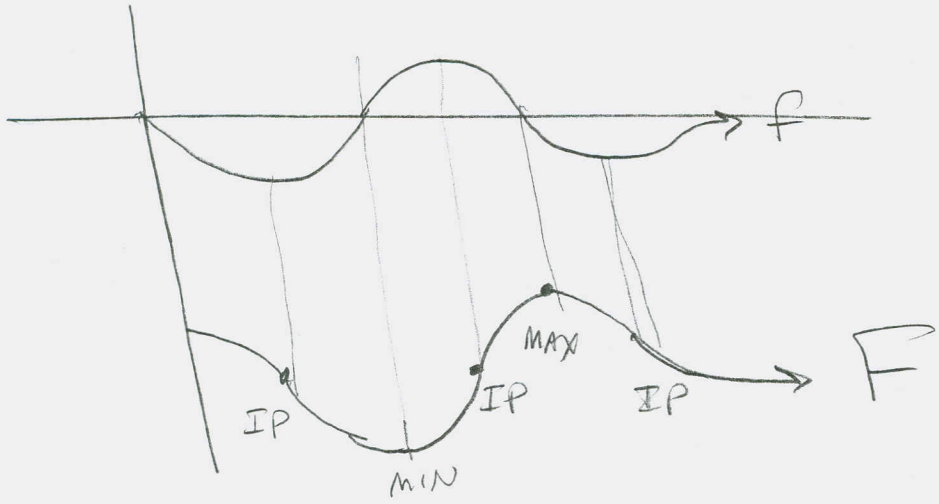


a is the antiderivative.

Its max is where $f = a'$ is zero.
f is positive to the left & negative to the right of a's max, ...

201 §4.9 #s 45, 46

(45) Make a rough sketch of the antiderivative of the function shown, f.



(46) The graph of a velocity function is given. Sketch the graph of the position function