Calculus I
Section 5.10 – Finding *f*(*x*)

Find *f*(*x*) given the following information.

1. $f'(x)=2x-3,\ f(1)=5$

2. $f'(x)=3x^2,\ f(0)=0$

3. $f'(x)=x^3-2x^2+1,\ f(0)=1$

4. $f'(x)=1+\sin x,\ f(0)=-3$

5. $f''(x)=x^2-3x+1,\ f'(0)=0,\ f(0)=0$

6. $f''(x)=4,\ f'(0)=1,\ f(0)=0$

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7. $f''(x)=4\cos 2x,\ f'(0)=-1,\ f(0)=-3$

8. $f''(x)=\dfrac{1}{\sqrt{2x+3}},\ f'(3)=1,\ f(3)=0$

9. $f'(x)=\sin\dfrac{1}{2}\pi x,\ f(0)=0$

10. $f''(x)=-3x,\ f'(0)=0,\ f(0)=1$

11. $f'(x)=\sqrt{3x+1},\ f(1)=5$

12. $f'(x)=6-5\sin 2x,\ f(0)=3$

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Find $f(x)$ given the following information.

1. $f'(x) = 2x - 3,\ f(1) = 5$

$f(x) = x^2 - 3x + C$

$5 = 1 - 3 + C$

$5 = -2 + C$

$7 = C$

$\boxed{f(x) = x^2 - 3x + 7}$

2. $f'(x) = 3x^2,\ f(0) = 0$

$f(x) = x^3 + C$

$\boxed{f(x) = x^3}$

3. $f'(x) = x^3 - 2x^2 + 1,\ f(0) = 1$

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

$1 = 0 - 0 + 0 + C$

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

4. $f'(x) = 1 + \sin x,\ f(0) = -3$

$f(x) = x - \cos x + C$

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

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

$\boxed{f(x) = x - \cos x - 2}$

5. $f''(x) = x^2 - 3x + 1,\ f'(0) = 0,\ f(0) = 0$

$f'(x) = \frac{1}{3}x^3 - \frac{3}{2}x^2 + x + C \Rightarrow C = 0$

$f(x) = \frac{1}{12}x^4 - \frac{1}{2}x^3 + \frac{1}{2}x^2 + C \Rightarrow C = 0$

$\boxed{f(x) = \frac{1}{12}x^4 - \frac{1}{2}x^3 + \frac{1}{2}x^2}$

6. $f''(x) = 4,\ f'(0) = 1,\ f(0) = 0$

$f'(x) = 4x + C \Rightarrow C = 1$

$f(x) = 2x^2 + x + C \Rightarrow C = 0$

$\boxed{f(x) = 2x^2 + x}$

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7. $f''(x) = 4\cos 2x,\ f'(0) = -1,\ f(0) = -3$

$f' = \int 2\cos u\,du$

$f' = 2\sin 2x + C$

$-1 = 2\sin(0) + C \Rightarrow C = -1$

$f'(x) = 2\sin 2x - 1$

$f(x) = -\cos 2x - x + C$

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

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

$f(x) = -\cos 2x - x - 2$

8. $f''(x) = \dfrac{1}{\sqrt{2x+3}},\ f'(3) = 1,\ f(3) = 0$

$(2x+3)^{-1/2}$

$f'(x) = \frac{1}{2}\cdot 2(2x+3)^{1/2} + C$

$1 = (9)^{1/2} + C \Rightarrow C = -2$

$f'(x) = (2x+3)^{1/2} - 2$

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

$0 = \frac{1}{3}(9)^{3/2} - 2(3) + C \Rightarrow C = -3$

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

9. $f'(x) = \sin\dfrac{1}{2}\pi x,\ f(0) = 0$

$f(x) = -\frac{2}{\pi}\cos\frac{\pi}{2}x + C$

$0 = -\frac{2}{\pi}\cos(0) + C$

$\Rightarrow C = 2/\pi$

$f(x) = -\frac{2}{\pi}\cos\frac{\pi}{2}x + \frac{2}{\pi}$

10. $f''(x) = -3x,\ f'(0) = 0,\ f(0) = 1$

$f'(x) = -\frac{3}{2}x^2 + C \Rightarrow C = 0$

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

$1 = 0 + C \Rightarrow C = 1$

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

11. $f'(x) = \sqrt{3x+1},\ f(1) = 5$

$f(x) = \frac{2}{3}(3x+1)^{3/2}\cdot\frac{1}{3} + C$

$5 = \frac{2}{9}(4)^{3/2} + C$

$5 = \frac{16}{9} + C \Rightarrow C = 29/9$

$f(x) = \frac{2}{9}(3x+1)^{3/2} + \frac{29}{9}$

12. $f'(x) = 6 - 5\sin 2x,\ f(0) = 3$

$f(x) = 6x + \frac{5}{2}\cos 2x + C$

$3 = 0 + \frac{5}{2} + C \Rightarrow C = 1/2$

$f(x) = 6x + \frac{5}{2}\cos 2x + 1/2$