Unit 5 Worksheet 1 - Solutions
Calculus 1

Find the general antiderivative *F(x)+C* for each of the following.

1. $f(x) = 7$

   $F(x) = 7x + C$

2. $f(x) = 2x - 4$

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

   $F(x) = x^2 - 4x + C$

3. $f(x) = 3x^2 + \sqrt{2}$

   $F(x) = \frac{3x^3}{3} + \sqrt{2}\,x + C$

   $F(x) = x^3 + \sqrt{2}\,x + C$

4. $f(x) = 5x^4 + \pi$

   $F(x) = \frac{5x^5}{5} + \pi x + C$

   $F(x) = x^5 + \pi x + C$

5. $f(x) = x^{2/3}$

   $F(x) = \frac{x^{5/3}}{\frac{5}{3}} + C$

   $F(x) = \frac{3}{5}x^{5/3} + C \quad or \quad \frac{3x^{5/3}}{5} + C$

6. $f(x) = x^{-3/4}$

   $F(x) = \frac{x^{1/4}}{\frac{1}{4}} + C$

   $F(x) = 4x^{1/4} + C$

7. $f(x) = 6x^2 - 6x + 1$

$F(x) = \frac{6x^3}{3} - \frac{6x^2}{2} + 1x + C$

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

8. $f(x) = 3x^2 + 10x - 7$

$F(x) = \frac{3x^3}{3} + \frac{10x^2}{2} - 7x + C$

$F(x) = x^3 + 5x^2 - 7x + C$

9. $f(x) = 18x^8 - 25x^4 + 3x^2$

$F(x) = \frac{18x^9}{9} - \frac{25x^5}{5} + \frac{3x^3}{3} + C$

$F(x) = 2x^9 - 5x^5 + x^3 + C$

10. $f(x) = x^2\left(20x^7 - 7x^4 + 6\right)$

$f(x) = 20x^9 - 7x^6 + 6x^2 + C$

$F(x) = \frac{20x^{10}}{10} - \frac{7x^7}{7} + \frac{6x^3}{3} + C$

$F(x) = 2x^{10} - x^7 + 2x^3 + C$

11. $f(x) = \frac{4}{x^5} - \frac{3}{x^4}$

$f(x) = 4x^{-5} - 3x^{-4}$

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

$F(x) = -x^{-4} + x^{-3} + C$ *or*

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

12. $f(x) = \frac{1}{x^3} + \frac{6}{x^7}$

$f(x) = x^{-3} + 6x^{-7}$

$F(x) = \frac{x^{-2}}{-2} + \frac{6x^{-6}}{-6} + C$

$F(x) = -\frac{x^{-2}}{2} - x^{-6} + C \quad or$

$F(x) = -\frac{1}{2}x^{-2} - x^{-6} + C \quad or$

$F(x) = -\frac{1}{2x^2} - \frac{1}{x^6} + C$

13. $f(x) = \frac{4x^6 + 3x^5 - 8}{x^5}$

$f(x) = \frac{4x^6}{x^5} + \frac{3x^5}{x^5} - \frac{8}{x^5}$

$f(x) = 4x + 3 - \frac{8}{x^5}$

$f(x) = 4x + 3 - 8x^{-5}$

$F(x) = \frac{4x^2}{2} + 3x - \frac{8x^{-4}}{-4} + C$

$F(x) = 2x^2 + 3x + 2x^{-4} + C \quad or$

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

14. $f(x)=\dfrac{2x^3-3x^2+1}{x^2}$

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

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

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

$F(x)=\dfrac{2x^2}{2}-3x+\dfrac{x^{-1}}{-1}+C$

$F(x)=x^2-3x-x^{-1}+C \quad or$

$F(x)=x^2-3x-\dfrac{1}{x}+C$

Find the indefinite integrals.

15. $\int\left(x^3+\sqrt{x}\right)dx$

$f(x)=x^3+\sqrt{x}$

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

$F(x)=\dfrac{x^4}{4}+\dfrac{x^{3/2}}{\frac{3}{2}}+C$

$F(x)=\dfrac{x^4}{4}+\dfrac{2x^{3/2}}{3}+C \quad or$

$F(x)=\dfrac{1}{4}x^4+\dfrac{2}{3}x^{3/2}+C$

16. $\int\left(x^2+1\right)^2\,dx$

$f(x)=\left(x^2+1\right)^2$

$f(x)=x^4+2x^2+1$

$F(x)=\dfrac{x^5}{5}+\dfrac{2x^3}{3}+x+C \quad or$

$F(x)=\dfrac{1}{5}x^5+\dfrac{2}{3}x^3+x+C$

17. $\int \left(y^2 + 4y\right)^2 \, dy$

$f(y) = \left(y^2 + 4y\right)^2$

$f(y) = y^4 + 8y^3 + 16y^2$

$F(y) = \frac{y^5}{5} + \frac{8y^4}{4} + \frac{16y^3}{3} + C \quad or$

$F(y) = \frac{y^5}{5} + 2y^4 + \frac{16y^3}{3} + C \quad or$

$F(y) = \frac{1}{5}y^5 + 2y^4 + \frac{16}{3}y^3 + C$

18. $\int y^2\left(y^2 - 3\right) dy$

$f(y) = y^2\left(y^2 - 3\right)$

$f(y) = y^4 - 3y^2$

$F(y) = \frac{y^5}{5} - \frac{3y^3}{3} + C \quad or$

$F(y) = \frac{y^5}{5} - y^3 + C \quad or$

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

19. $\int\left(\frac{x^4-2x^3+1}{x^2}\right)dx$

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

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

$f(x)=x^2-2x+x^{-2}$

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

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

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

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

20. $\int\left(\frac{x^3-3x^2+1}{\sqrt{x}}\right)dx$

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

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

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

$f(x)=x^{5/2}-3x^{3/2}+x^{-1/2}$

$F(x)=\frac{x^{7/2}}{\frac{7}{2}}-\frac{3x^{5/2}}{\frac{5}{2}}+\frac{x^{1/2}}{\frac{1}{2}}+C$

$F(x)=\frac{2}{7}x^{7/2}-\frac{6}{5}x^{5/2}+2x^{1/2}+C \quad or$

$F(x)=\frac{2x^{7/2}}{7}-\frac{6x^{5/2}}{5}+2x^{1/2}+C$