

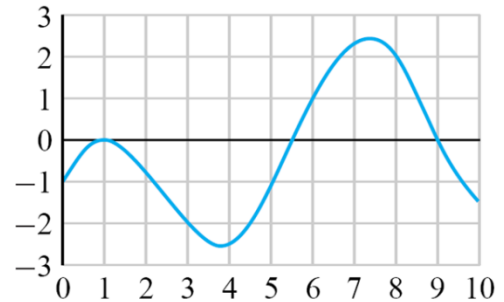
Calculus 1 Review Problems

These problems relate to the major concepts from Calculus 1. You are responsible for these concepts and any other material from that course.

Interpreting the Derivative (Chapter 1)

Shown here is the graph of $y = g'(x)$.

1. On which intervals is g decreasing?
2. On which intervals is g'' positive?
3. Where does g have stationary points?
4. Where does g have local maximum points?
5. Is g concave up at $x = 3$?
6. Is g'' increasing at $x = 7$?
7. Suppose that $g(3) = 4$. Find an equation of the line tangent to g at $x = 3$.



Derivative Formulas (Chapters 2 and 3)

Find a formula for the derivative of each of the following functions.

8. $A(x) = 15x^6 - 5\sqrt[3]{x} + \frac{14}{x} - 100$
9. $B(x) = \sqrt{x^3 - 10x + 25}$
10. $C(x) = x^2 \cos(x)$
11. $D(x) = \tan(\pi x)$
12. $E(x) = \frac{x^3 + x}{2x^2 - 5}$
13. $F(x) = \sin^{-1}(4x^2)$

Integrals (Chapter 5)

Evaluate each of the following integrals.

14. $\int \left(2x^3 - \frac{4}{\sqrt{x}} + 10 \right) dx$

15. $\int_2^6 (4x - 3) dx$

16. $\int_0^5 \sqrt{25 - x^2} dx$

17. $\int_0^1 \frac{1}{1+x^2} dx$

18. $\int \sin(4x) dx$

19. $\int_2^3 \frac{4x}{1-x^2} dx$

20. $\int \frac{x}{\sqrt{1-x^4}} dx$

Solutions

1. $0 \leq x < 1, 1 < x < 5.5, \text{ and } 9 < x \leq 10$

2. $0 \leq x < 1 \text{ and } 3.8 < x < 7.2$

3. $x = 1, 5.5, 9$

4. $x = 9$

5. no

6. no

7. $y = -2x + 10$

8. $A'(x) = 90x^5 - \frac{5}{3}x^{-2/3} - 14x^{-2}$

9. $B'(x) = \frac{1}{2}(x^3 - 10x + 25)^{-1/2} \cdot (3x^2 - 10)$

10. $C'(x) = 2x \cdot \cos(x) + x^2 \cdot (-\sin(x))$

11. $D'(x) = \sec^2(\pi x) \cdot \pi$

12. $E'(x) = \frac{(3x^2+1) \cdot (2x^2-5) - (x^3+x) \cdot 4x}{(2x^2-5)^2}$

13. $F'(x) = \frac{1}{\sqrt{1-16x^4}} \cdot 8x$

14. $\frac{1}{2}x^4 - 8\sqrt{x} + 10x + C$

15. 52

16. $25\pi/4$

17. $\pi/4$

18. $-\frac{\cos(4x)}{4} + C$

19. $\frac{\ln(3/8)}{2}$

20. $\frac{1}{2}\sin^{-1}(x^2) + C$