

TOM APOSTOL CALCULUS VOL 2 SOLUTIONS

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Tom Apostol Calculus Vol. 2 Solutions: Questions and Answers

Q1. Find the derivative of the function $f(x) = \sin(x) + \cos(x)$.

A1. $f'(x) = \cos(x) - \sin(x)$

Q2. Evaluate the integral $\int (x^2 + 1) dx$.

A2. $\int (x^2 + 1) dx = (x^3)/3 + x + C$, where C is an arbitrary constant.

Q3. Find the limit of the function $\lim_{x \rightarrow 0} (\sin(x))/x$.

A3. $\lim_{x \rightarrow 0} (\sin(x))/x = 1$

Q4. Determine whether the series $\sum_{n=1}^{\infty} (n^2 + 1)/(2n^3 + 3)$ converges or diverges.

A4. The series diverges by the Comparison Test.

Q5. Find the equation of the tangent line to the curve $y = x^3$ at the point $(1, 1)$.

A5. $y = 3x - 2$

Teaching Transparency 31: The Activity Series - Questions and Answers

Paragraph 1:

Question 1: What is the activity series?

Answer: The activity series is a ranking of metals arranged in decreasing order of their reactivity, from most reactive to least reactive.

Question 2: Which metal is most reactive on the activity series?

Answer: Potassium (K)

Paragraph 2:

Question 3: What is the relationship between the activity series and the ability of metals to displace other metals from aqueous solutions?

Answer: Metals higher on the activity series can displace metals lower on the series from their aqueous solutions.

Question 4: For example, what happens when zinc (Zn) is added to a copper sulfate (CuSO₄) solution?

Answer: Zinc displaces copper from the solution, forming zinc sulfate (ZnSO₄) and elemental copper (Cu).

Paragraph 3:

Question 5: What is the role of the salt bridge in an electrochemical cell?

Answer: The salt bridge allows ions to flow between the compartments of the cell, completing the circuit and maintaining electrical neutrality.

Question 6: Why does the anode gain electrons in an electrochemical cell?

Answer: The anode is where oxidation occurs, which involves the loss of electrons.

Question 7: What is the potential difference between the electrodes in an electrochemical cell?

Answer: The potential difference is the voltage generated by the cell and is measured in volts (V).

Paragraph 4:

Question 8: Which type of electrode is used to generate a metal cation?

Answer: An anode

Question 9: Where does the copper plate in a copper sulfate electrochemical cell act as the anode?

Answer: In the compartment where copper is being oxidized and dissolved into the solution.

Paragraph 5:

Question 10: What is the purpose of using inert electrodes in some electrochemical cells?

Answer: To prevent the electrodes from participating in the electrochemical reactions and affecting the cell's behavior.

Tricky Math Problems and Their Answers

Math can be challenging, but sometimes, the most perplexing problems are those that seem simple at first glance. Here are five tricky math problems that will test your logical thinking and problem-solving skills, along with their intriguing answers:

Question 1: A man has 50 sheep. All but 6 die. How many sheep are left? **Answer:** Six

Question 2: If you take 10 from 20, what remains? **Answer:** 20

Question 3: A farmer has 12 sheep. Half are black, and half are white. How many are black and white? **Answer:** None

Question 4: A man is driving his car at night. His headlights shine on a man standing in the middle of the road. However, the man driving doesn't crash. Why? **Answer:** It's daylight

Question 5: A train leaves Boston at 10:00 AM and travels at 60 mph. Another train leaves New York at 11:00 AM and travels at 90 mph. Assuming both trains are traveling on the same track, at what time will they meet? **Answer:** They will never

meet, as they are traveling on different tracks

Years of the Throstle: A Glimpse into West Bromwich Albion F.C.'s History

1. When was West Bromwich Albion F.C. founded?

West Bromwich Albion F.C., affectionately known as the "Throstles," was founded in 1878, making it one of the oldest football clubs in the world.

2. What is the significance of the club's nickname, the "Throstles"?

The name "Throstles" derives from the local nickname for the song thrush, a type of bird common in the area. The club's founder, William Bassford, chose the name to symbolize the team's fighting spirit and determination.

3. What are some of the club's notable achievements?

Over its long history, West Bromwich Albion has won several major trophies, including the FA Cup five times (1888, 1892, 1931, 1954, 1968) and the Football League Championship once (1919-20). The club has also competed in numerous European competitions, reaching the semi-finals of the UEFA Cup in 1980.

4. What is West Bromwich Albion's current status?

After a successful stint in the Premier League, West Bromwich Albion was relegated to the Championship (second tier) in 2021. The club is currently working towards regaining promotion to the top flight of English football.

5. What is the club's home stadium?

West Bromwich Albion plays its home matches at The Hawthorns, a stadium located in the West Midlands. The Hawthorns has been the club's home ground since 1900 and has witnessed some of the most memorable moments in West Bromwich Albion's history.

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