Name: _____ **Date:** _____

Westworld Tactics: 11th Grade Neural Network Synthesis Quiz

Synthesize complex AI concepts including GANs and backpropagation through 10 advanced scenarios to master the architecture of machine intelligence.

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1. In the context of Generative Adversarial Networks (GANs), the 'Generator' and 'Discriminator' engage in a zero-sum game. What specific mathematical concept describes the point where the Generator produces perfect replicas and the Discriminator can no longer distinguish them?

A. The Turing Threshold
B. Nash Equilibrium
C. Backpropagation Divergence
D. Stochastic Gradient Descent

2. The 'Vanishing Gradient Problem' primarily occurs in deep neural networks because the repetitive multiplication of small derivatives during backpropagation causes the weight updates to become infinitesimally small.

A. True
B. False

3. When building a model to predict protein folding patterns for pharmaceutical research, a developer uses _____ to prevent the model from memorizing training data too closely, ensuring it generalizes to new biological structures.

A. Hyperparameter tuning
B. Data augmentation
C. Regularization
D. Supervised clustering

4. Which architecture is most associated with the breakthrough in Large Language Models (LLMs) due to its 'Self-Attention' mechanism, allowing it to process entire sequences of text simultaneously rather than word-by-word?

A. Convolutional Neural Network (CNN)
B. Recurrent Neural Network (RNN)
C. Transformer Architecture
D. Boltzmann Machine

5. In the development of AI for high-frequency trading, a system is rewarded with 'points' for profitable trades and penalized for losses. This specific paradigm of machine learning is known as _____.

A. Unsupervised Learning
B. Reinforcement Learning
C. Semi-supervised Learning
D. Symbolic Logic

Name: _____ Date: _____

6. Convolutional Neural Networks (CNNs) are primarily preferred for Computer Vision tasks because they use 'pooling' layers to reduce spatial dimensions while retaining critical features.

A. True
B. False

7. Consider an AI designed for autonomous deep-sea exploration. If the system encounters a completely unknown species and classifies it based only on shared data similarities without prior labels, it is performing:

A. Clustering (Unsupervised)
B. Regression (Supervised)
C. Classification (Supervised)
D. Few-shot prompting

8. The ethical concern regarding 'black box' AI models in the legal system—where a model's specific reasoning for a sentencing recommendation cannot be understood by humans—is a failure of _____.

A. Algorithmic Efficiency
B. Explainability (XAI)
C. Linear Algebra
D. Data Latency

9. In a neural network, the 'Activation Function' (such as ReLU or Sigmoid) is necessary because it introduces non-linearity, allowing the network to model complex relationships beyond simple straight lines.

A. True
B. False

10. Which term describes the phenomenon where a model performs exceptionally well on training data but fails to predict correctly on new, real-world data?

A. Underfitting
B. Overfitting
C. Convergence
D. Dimensionality Reduction