Practical Assignment No. 1 **Title:** Vertex Cover problem

```
import time
import networkx as nx
import matplotlib.pyplot as plt

def approx_vertex_cover(graph):
    visited = set()
    cover = set()

    for u, v in graph.edges():
        if u not in visited and v not in visited:
            cover.add(u)
            cover.add(v)
            visited.add(u)
            visited.add(v)
    return cover

# Graphs of different sizes
sizes = [10, 50, 100, 200, 500]
times = []

for size in sizes:
    G = nx.gnm_random_graph(size, size * 2, seed=42)  # Random graph with 2*size
edges
    start = time.perf_counter()
    cover = approx_vertex_cover(G)
    end = time.perf_counter()
    times.append(end - start)

# Plotting results
plt.plot(sizes, times, marker='o')
plt.xlabel('Graph Size (nodes)')
plt.ylabel('Time (seconds)')
plt.title('Graph Size vs Time for Approx Vertex Cover')
plt.grid(True)
plt.show()
```

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