OPTI 500 A, Fall 2011
Homework #1, Solutions

1. Describe the difference between time division multiplexing and wavelength division multiplexing. Use sketches, but no more than one paragraph.

TDM – multiple signals are bit or byte interleaved onto a single higher data rate signal
WDM – multiple signals are transmitted on separate wavelengths combined into a fiber

2. Calculate the wavelength, in nanometers, of the center wavelength of the ITU DWDM grid.

$$Lamda = \frac{c}{193.1THz} = 1553\,nm$$

3. List four data rates specified in the SONET protocol.

OC-1,51.84Mbps; OC-48,2488.32Mbps; OC-192,9953.28Mbps; OC-768,39813.12Mbps

4. In your own words, describe the categories of switching used in communication networks that we have discussed in class. Use no more than two sentences to describe each category.

Broadcasting – Every node receives the transmitted data
Circuit Switching – Data is transmitted through a dedicated path without the need to examine the packet along the way
Packet Switching – Data is routed from one node to another by examining packet headers.

5. In your own words, describe the function of each of the OSI Network Model layers. Use no more than two sentences to describe each layer.

Application Layer – Provides interface to the user.
Presentation Layer – Encodes and decodes data
Session Layer – Manages communication between applications
Transport Layer – Establishes host-to-host connection and manages data at hosts just before and after transmission
Network Layer – Handles routing between networks.
Data Link Layer – Handles switching within networks
Physical Layer – Defines physical requirements for data links