ITS 323 – QUIZ 2 (ITB)

First name: _____ Last name: _____

ID: _____ Total Marks: _____
out of 8.5

Question 1 [3 marks]

a) What is the bandwidth of a signal that can be decomposed into four sine waves with frequencies at 30, 80, 180, and 280 MHz?

Answer: _____

b) A device is sending out data at the rate of 1000bps. How long does it take to send out 10 bits?

Answer: _____

c) *Circle the correct words*: Making a telephone call over the ordinary fixed-line telephone network is an example sending [Analog / Digital] data over a [Analog / Digital] signal.

d) Consider the following two signals:

$S1 = (4/\pi)\,[\sin(2\pi ft) + (1/3)\sin(2\pi(3f)t) + (1/5)\sin(2\pi(5f)t)]$

$S2 = (4/\pi)\,[\sin(2\pi ft)]$

If our transmission system supports the bandwidth of 8kHz, which signal (S1 or S2) provides the highest data rate?

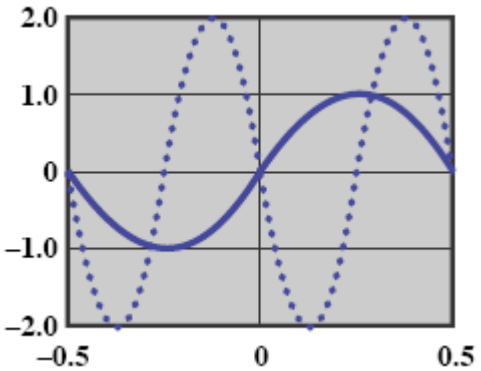
Answer: _____

e) From your answer of part (d), although the signal you selected provides the highest data rate, what is a disadvantage of the signal (compared to the other lower data rate signal)?

Answer: _____

Question 2 [1.5 mark]

If the solid curve of the figure below represents $\sin(2\pi t)$, what does the dotted curve represent? That is, the dotted curve can be written in the form $A \sin(2\pi ft + \phi)$; what are A, f, and ϕ?



Question 3 [2 marks]

Given a channel with an intended capacity of 18kb/s, the bandwidth of the channel is 3kHz. What signal-to-noise ratio is required to achieve this capacity?

Question 4 [2 marks]

If the **Non-Return-to-Zero Invert on ones (NRZI)** encoding scheme is used, complete the bit pattern that the following signal represents. (That is, fill in the boxes).