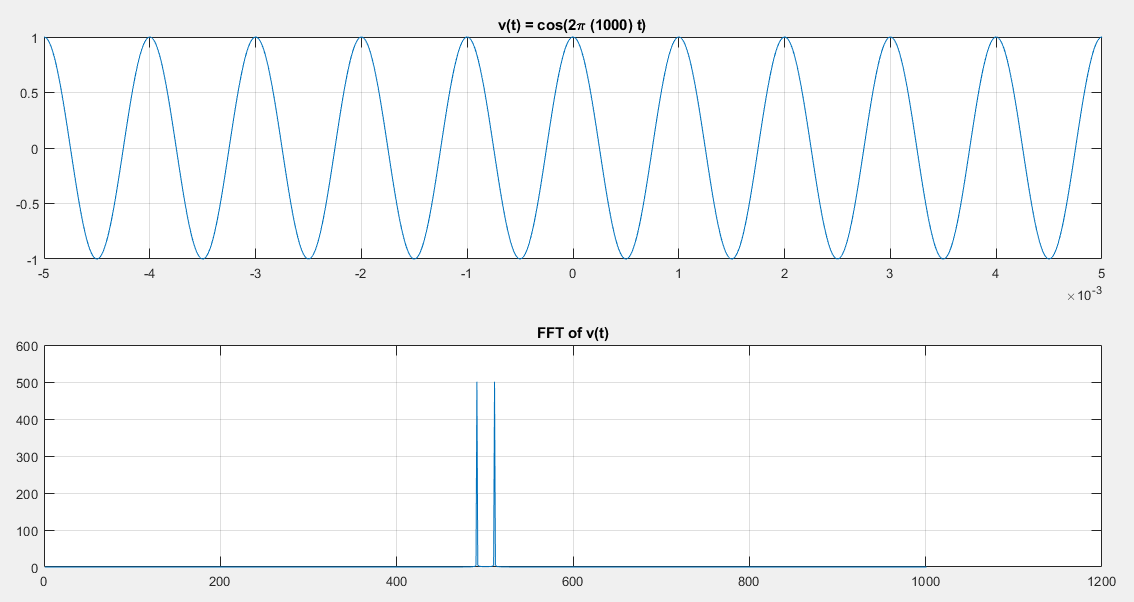
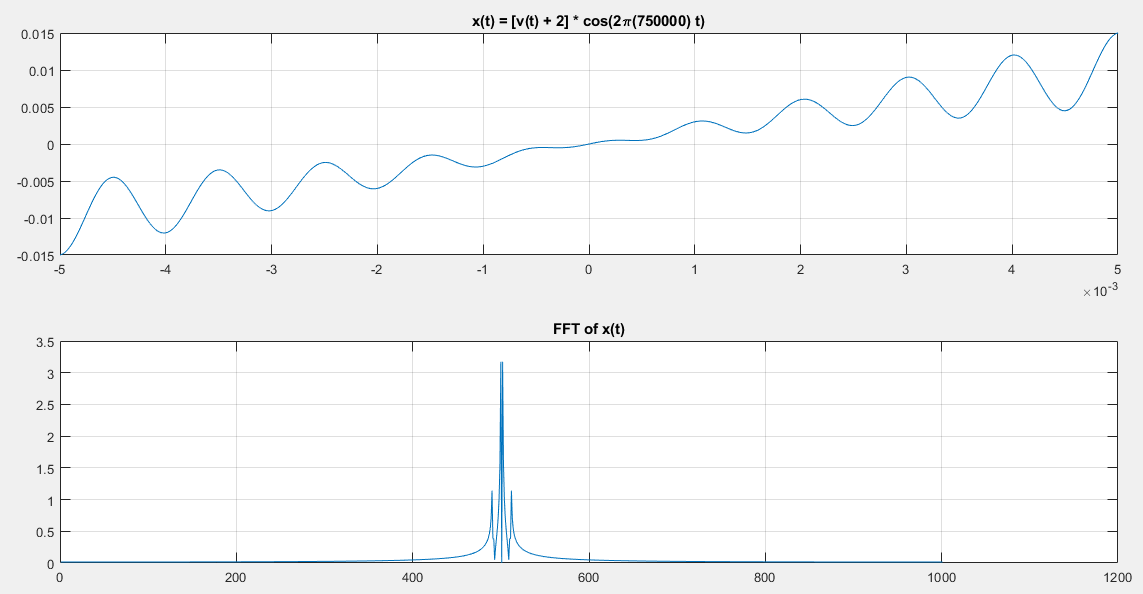
**Problem 1**

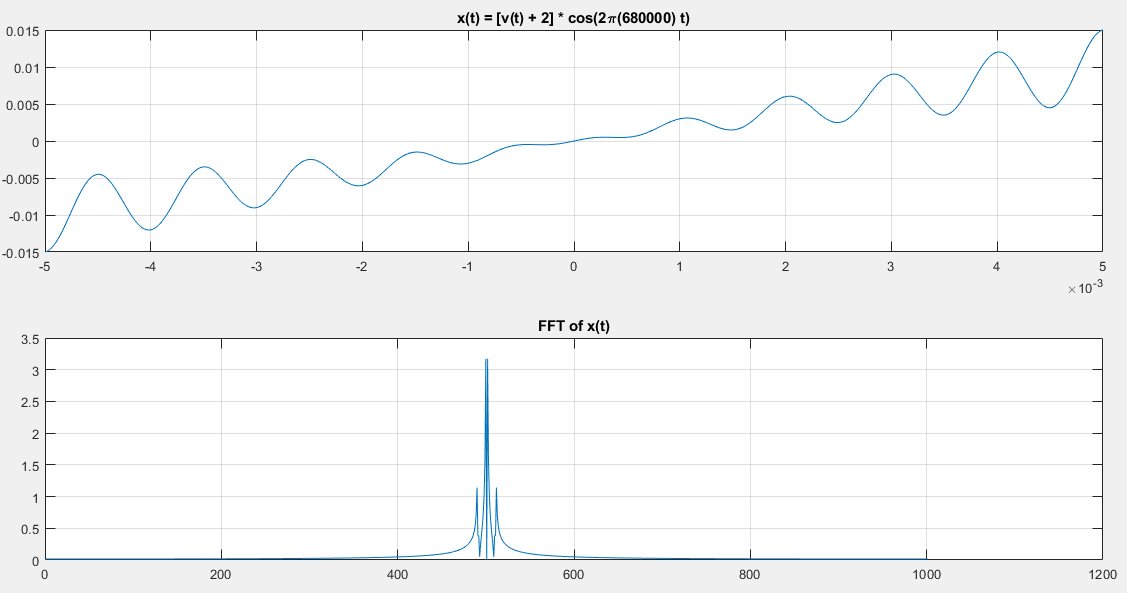
(a)

**Problem 2**

(a)

(b)

(c) The spectrum does not change as the carrier frequency is changed.

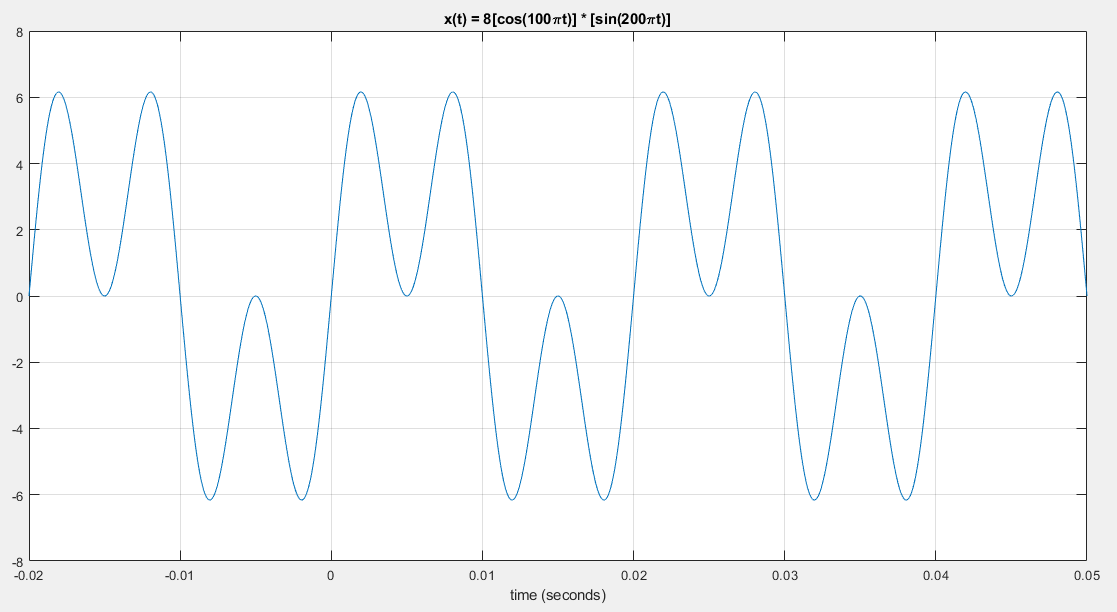


**Problem 4**

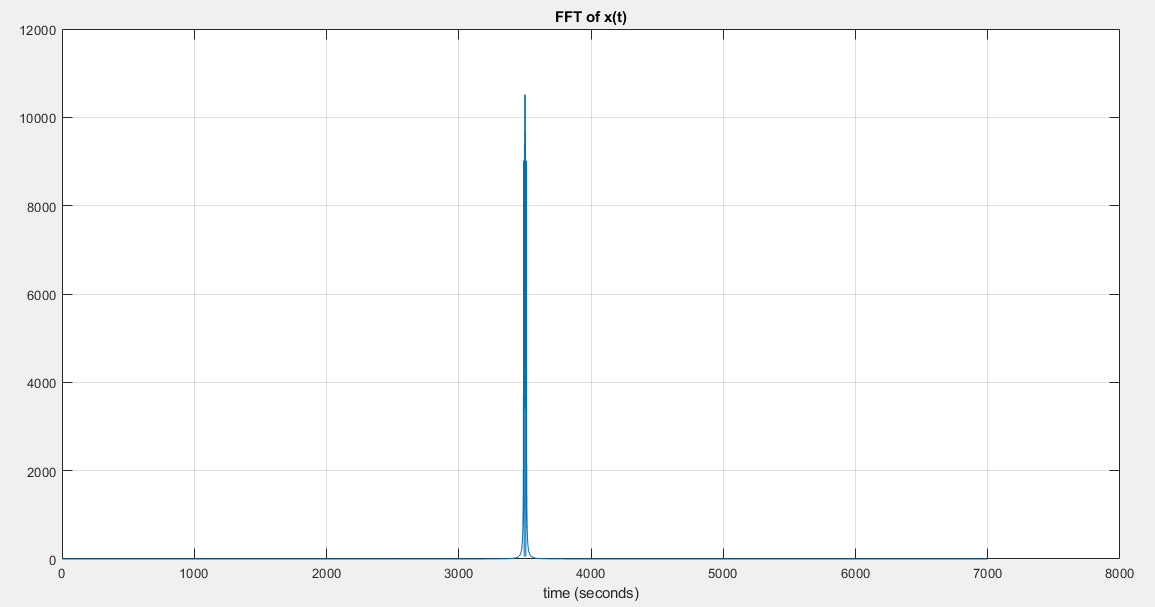
(a)

(b)

(c)

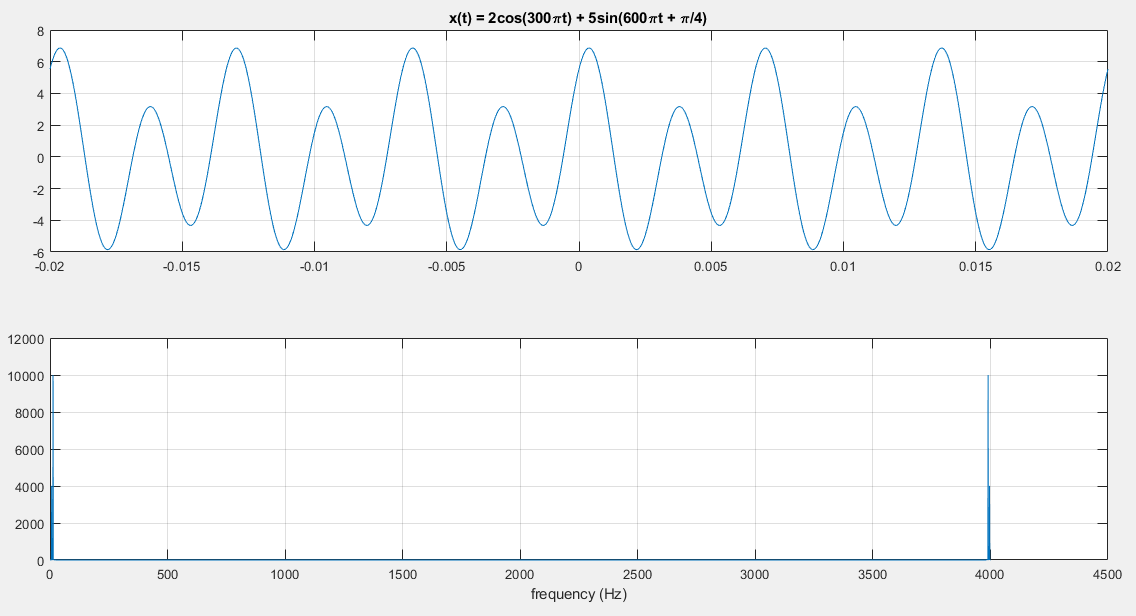


(d)



**Problem 5**

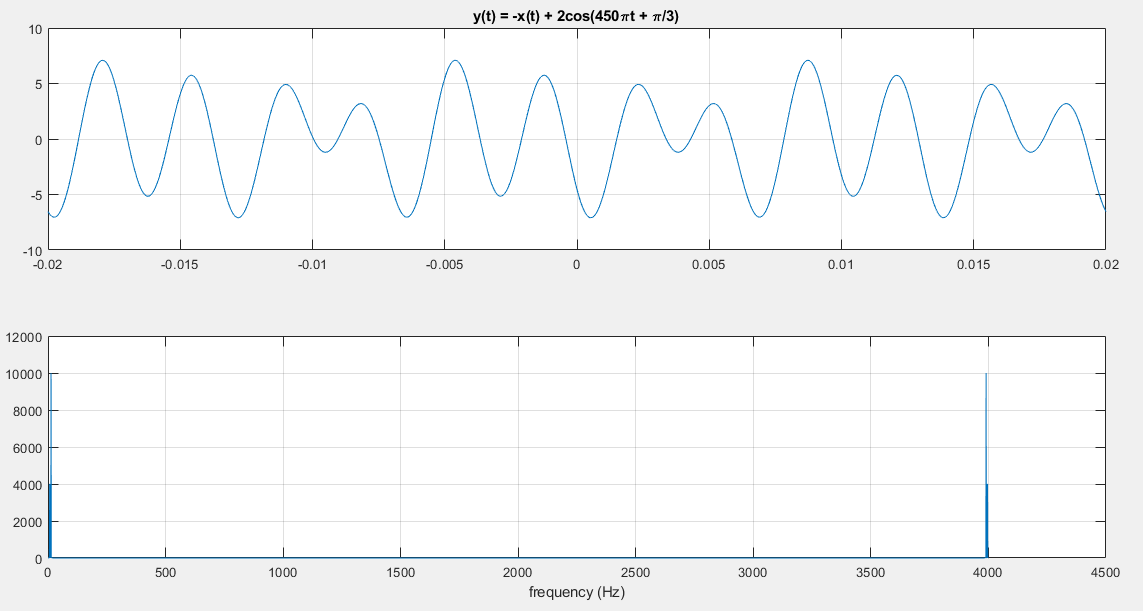
(a)



(b) x(t) is periodic with period 0.0067. There are harmonics at:

|  |  |
| --- | --- |
| **Frequency (Hz)** | **Power** |
| 7 | 10002 |
| 13 | 4006 |
| 3990 | 4006 |
| 3996 | 10002 |

(c) The frequency spectrum has not changed. y(t) is periodic with period 0.0133.



**Problem 6**

(a)

|  |  |  |
| --- | --- | --- |
| Note name | Note number | frequency |
| A | 49 | 440 |
| Bb | 50 | 466.16 |
| B | 51 | 493.88 |
| C | 52 | 523.25 |
| C# | 53 | 554.37 |
| D | 54 | 587.33 |
| Eb | 55 | 622.25 |
| E | 56 | 659.25 |
| F | 57 | 698.46 |
| F# | 58 | 739.99 |
| G | 58 | 783.99 |
| G# | 60 | 830.61 |
| A | 61 | 880 |

(b)

fn = frequency of note n

n = steps away from 49 (440Hz) (i.e. for note 50, n=1)

**Problem 7**