a. ak

n

jk; |k| < 3

0 otherwise

$x(t) = -2 \sin(\pi t/2) - 4 \sin(\pi t)$

for $0 \le t < 4$.

x(t) = X∞

k=−∞

ake

j

2π

T

kt = −2je−j

2π

4

2t − je−j

2π

4

t + je j

2π

4

t + 2je j

2π

4

2t

$= -2\sin(\pi t/2) - 4\sin(\pi t)$

b. bk =

□

1; k odd

0; k even

$x(t) = 2\delta(t) - 2\delta(t-2)$ for $0 \le t < 4$.

x(t) = X∞

k=−∞

bke

j

2π

T

kt =

X∞

k = −∞

k odd

e

jπkt/2

Unfortunately, this sum is not easy to close. However, it is closely related to the synthesis formula for an impulse train,

xδ(t) = X∞

k=−∞

δ(t − kT) = X∞

k=−∞

ake

jπkt/2 =

X∞

k=−∞

1

T

e

jπkt/2

.

If there were two impulses per period instead of one, then

x2δ(t) = X∞

k=−∞

δ(t − kT) + δ(t −

T

2

− kT) = X∞

k=−∞

1

T

e

j2πkt/4 +

1

T

e

j2πk(t−2)/4

=

X∞

k=−∞

1

T

e

$j\pi kt/2$

□

$1 + e$

$j\pi k$□

$=$

$X\infty$

$k = -\infty$

k even

2

T

e

$j\pi kt/2$

It follows that $x(t) = T\, x\delta(t) -$

T

2

$x2\delta(t) = 4x\delta(t) - 2x2\delta(t)$ so that $x(t)$ is an alternating sequence of impulses

$x(t) = X\infty$

$l=-\infty$

$2\delta(t - 4l)\ -6\ 2\delta(t - 2 - 4l)$