

Intro

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data.table 1.11.4 Latest news: <http://r-datatable.com>

Warning in library(package, lib.loc = lib.loc, character.only = TRUE,
logical.return = TRUE, : there is no package called 'directlabels'

manufacturer	model	displ	year	cyl	trans	drv	cty	hwy	fl	class
audi	a4	1.8	1999	4	auto(l5)	f	18	29	p	compact
audi	a4	1.8	1999	4	manual(m5)	f	21	29	p	compact
audi	a4	2.0	2008	4	manual(m6)	f	20	31	p	compact
audi	a4	2.0	2008	4	auto(av)	f	21	30	p	compact
audi	a4	2.8	1999	6	auto(l5)	f	16	26	p	compact
audi	a4	2.8	1999	6	manual(m5)	f	18	26	p	compact
audi	a4	3.1	2008	6	auto(av)	f	18	27	p	compact
audi	a4 quattro	1.8	1999	4	manual(m5)	4	18	26	p	compact
audi	a4 quattro	1.8	1999	4	auto(l5)	4	16	25	p	compact
audi	a4 quattro	2.0	2008	4	manual(m6)	4	20	28	p	compact
audi	a4 quattro	2.0	2008	4	auto(s6)	4	19	27	p	compact
audi	a4 quattro	2.8	1999	6	auto(l5)	4	15	25	p	compact
audi	a4 quattro	2.8	1999	6	manual(m5)	4	17	25	p	compact
audi	a4 quattro	3.1	2008	6	auto(s6)	4	17	25	p	compact
audi	a4 quattro	3.1	2008	6	manual(m6)	4	15	25	p	compact
audi	a6 quattro	2.8	1999	6	auto(l5)	4	15	24	p	midsize
audi	a6 quattro	3.1	2008	6	auto(s6)	4	17	25	p	midsize
audi	a6 quattro	4.2	2008	8	auto(s6)	4	16	23	p	midsize
chevrolet	c1500 suburban 2wd	5.3	2008	8	auto(l4)	r	14	20	r	suv
chevrolet	c1500 suburban 2wd	5.3	2008	8	auto(l4)	r	11	15	e	suv
chevrolet	c1500 suburban 2wd	5.3	2008	8	auto(l4)	r	14	20	r	suv
chevrolet	c1500 suburban 2wd	5.7	1999	8	auto(l4)	r	13	17	r	suv
chevrolet	c1500 suburban 2wd	6.0	2008	8	auto(l4)	r	12	17	r	suv
chevrolet	corvette	5.7	1999	8	manual(m6)	r	16	26	p	2seater
chevrolet	corvette	5.7	1999	8	auto(l4)	r	15	23	p	2seater
chevrolet	corvette	6.2	2008	8	manual(m6)	r	16	26	p	2seater
chevrolet	corvette	6.2	2008	8	auto(s6)	r	15	25	p	2seater
chevrolet	corvette	7.0	2008	8	manual(m6)	r	15	24	p	2seater
chevrolet	k1500 tahoe 4wd	5.3	2008	8	auto(l4)	4	14	19	r	suv
chevrolet	k1500 tahoe 4wd	5.3	2008	8	auto(l4)	4	11	14	e	suv

manufacturer	model	displ	year	cyl	trans	drv	cty	hwy	fl	class
chevrolet	k1500 tahoe 4wd	5.7	1999	8	auto(14)	4	11	15	r	suv
chevrolet	k1500 tahoe 4wd	6.5	1999	8	auto(14)	4	14	17	d	suv
chevrolet	malibu	2.4	1999	4	auto(14)	f	19	27	r	midsize
chevrolet	malibu	2.4	2008	4	auto(14)	f	22	30	r	midsize
chevrolet	malibu	3.1	1999	6	auto(14)	f	18	26	r	midsize
chevrolet	malibu	3.5	2008	6	auto(14)	f	18	29	r	midsize
chevrolet	malibu	3.6	2008	6	auto(s6)	f	17	26	r	midsize
dodge	caravan 2wd	2.4	1999	4	auto(13)	f	18	24	r	minivan
dodge	caravan 2wd	3.0	1999	6	auto(14)	f	17	24	r	minivan
dodge	caravan 2wd	3.3	1999	6	auto(14)	f	16	22	r	minivan
dodge	caravan 2wd	3.3	1999	6	auto(14)	f	16	22	r	minivan
dodge	caravan 2wd	3.3	2008	6	auto(14)	f	17	24	r	minivan
dodge	caravan 2wd	3.3	2008	6	auto(14)	f	17	24	r	minivan
dodge	caravan 2wd	3.3	2008	6	auto(14)	f	11	17	e	minivan
dodge	caravan 2wd	3.8	1999	6	auto(14)	f	15	22	r	minivan
dodge	caravan 2wd	3.8	1999	6	auto(14)	f	15	21	r	minivan
dodge	caravan 2wd	3.8	2008	6	auto(16)	f	16	23	r	minivan
dodge	caravan 2wd	4.0	2008	6	auto(16)	f	16	23	r	minivan
dodge	dakota pickup 4wd	3.7	2008	6	manual(m6)	4	15	19	r	pickup
dodge	dakota pickup 4wd	3.7	2008	6	auto(14)	4	14	18	r	pickup
dodge	dakota pickup 4wd	3.9	1999	6	auto(14)	4	13	17	r	pickup
dodge	dakota pickup 4wd	3.9	1999	6	manual(m5)	4	14	17	r	pickup
dodge	dakota pickup 4wd	4.7	2008	8	auto(15)	4	14	19	r	pickup
dodge	dakota pickup 4wd	4.7	2008	8	auto(15)	4	14	19	r	pickup
dodge	dakota pickup 4wd	4.7	2008	8	auto(15)	4	9	12	e	pickup
dodge	dakota pickup 4wd	5.2	1999	8	manual(m5)	4	11	17	r	pickup
dodge	dakota pickup 4wd	5.2	1999	8	auto(14)	4	11	15	r	pickup
dodge	durango 4wd	3.9	1999	6	auto(14)	4	13	17	r	suv
dodge	durango 4wd	4.7	2008	8	auto(15)	4	13	17	r	suv
dodge	durango 4wd	4.7	2008	8	auto(15)	4	9	12	e	suv
dodge	durango 4wd	4.7	2008	8	auto(15)	4	13	17	r	suv
dodge	durango 4wd	5.2	1999	8	auto(14)	4	11	16	r	suv
dodge	durango 4wd	5.7	2008	8	auto(15)	4	13	18	r	suv
dodge	durango 4wd	5.9	1999	8	auto(14)	4	11	15	r	suv
dodge	ram 1500 pickup 4wd	4.7	2008	8	manual(m6)	4	12	16	r	pickup
dodge	ram 1500 pickup 4wd	4.7	2008	8	auto(15)	4	9	12	e	pickup
dodge	ram 1500 pickup 4wd	4.7	2008	8	auto(15)	4	13	17	r	pickup
dodge	ram 1500 pickup 4wd	4.7	2008	8	auto(15)	4	13	17	r	pickup
dodge	ram 1500 pickup 4wd	4.7	2008	8	manual(m6)	4	12	16	r	pickup
dodge	ram 1500 pickup 4wd	4.7	2008	8	manual(m6)	4	9	12	e	pickup
dodge	ram 1500 pickup 4wd	5.2	1999	8	auto(14)	4	11	15	r	pickup
dodge	ram 1500 pickup 4wd	5.2	1999	8	manual(m5)	4	11	16	r	pickup
dodge	ram 1500 pickup 4wd	5.7	2008	8	auto(15)	4	13	17	r	pickup
dodge	ram 1500 pickup 4wd	5.9	1999	8	auto(14)	4	11	15	r	pickup
ford	expedition 2wd	4.6	1999	8	auto(14)	r	11	17	r	suv
ford	expedition 2wd	5.4	1999	8	auto(14)	r	11	17	r	suv

manufacturer	model	displ	year	cyl	trans	drv	cty	hwy	fl	class
ford	expedition 2wd	5.4	2008	8	auto(l6)	r	12	18	r	suv
ford	explorer 4wd	4.0	1999	6	auto(l5)	4	14	17	r	suv
ford	explorer 4wd	4.0	1999	6	manual(m5)	4	15	19	r	suv
ford	explorer 4wd	4.0	1999	6	auto(l5)	4	14	17	r	suv
ford	explorer 4wd	4.0	2008	6	auto(l5)	4	13	19	r	suv
ford	explorer 4wd	4.6	2008	8	auto(l6)	4	13	19	r	suv
ford	explorer 4wd	5.0	1999	8	auto(l4)	4	13	17	r	suv
ford	f150 pickup 4wd	4.2	1999	6	auto(l4)	4	14	17	r	pickup
ford	f150 pickup 4wd	4.2	1999	6	manual(m5)	4	14	17	r	pickup
ford	f150 pickup 4wd	4.6	1999	8	manual(m5)	4	13	16	r	pickup
ford	f150 pickup 4wd	4.6	1999	8	auto(l4)	4	13	16	r	pickup
ford	f150 pickup 4wd	4.6	2008	8	auto(l4)	4	13	17	r	pickup
ford	f150 pickup 4wd	5.4	1999	8	auto(l4)	4	11	15	r	pickup
ford	f150 pickup 4wd	5.4	2008	8	auto(l4)	4	13	17	r	pickup
ford	mustang	3.8	1999	6	manual(m5)	r	18	26	r	subcompact
ford	mustang	3.8	1999	6	auto(l4)	r	18	25	r	subcompact
ford	mustang	4.0	2008	6	manual(m5)	r	17	26	r	subcompact
ford	mustang	4.0	2008	6	auto(l5)	r	16	24	r	subcompact
ford	mustang	4.6	1999	8	auto(l4)	r	15	21	r	subcompact
ford	mustang	4.6	1999	8	manual(m5)	r	15	22	r	subcompact
ford	mustang	4.6	2008	8	manual(m5)	r	15	23	r	subcompact
ford	mustang	4.6	2008	8	auto(l5)	r	15	22	r	subcompact
ford	mustang	5.4	2008	8	manual(m6)	r	14	20	p	subcompact
honda	civic	1.6	1999	4	manual(m5)	f	28	33	r	subcompact
honda	civic	1.6	1999	4	auto(l4)	f	24	32	r	subcompact
honda	civic	1.6	1999	4	manual(m5)	f	25	32	r	subcompact
honda	civic	1.6	1999	4	manual(m5)	f	23	29	p	subcompact
honda	civic	1.6	1999	4	auto(l4)	f	24	32	r	subcompact
honda	civic	1.8	2008	4	manual(m5)	f	26	34	r	subcompact
honda	civic	1.8	2008	4	auto(l5)	f	25	36	r	subcompact
honda	civic	1.8	2008	4	auto(l5)	f	24	36	c	subcompact
honda	civic	2.0	2008	4	manual(m6)	f	21	29	p	subcompact
hyundai	sonata	2.4	1999	4	auto(l4)	f	18	26	r	midsize
hyundai	sonata	2.4	1999	4	manual(m5)	f	18	27	r	midsize
hyundai	sonata	2.4	2008	4	auto(l4)	f	21	30	r	midsize
hyundai	sonata	2.4	2008	4	manual(m5)	f	21	31	r	midsize
hyundai	sonata	2.5	1999	6	auto(l4)	f	18	26	r	midsize
hyundai	sonata	2.5	1999	6	manual(m5)	f	18	26	r	midsize
hyundai	sonata	3.3	2008	6	auto(l5)	f	19	28	r	midsize
hyundai	tiburon	2.0	1999	4	auto(l4)	f	19	26	r	subcompact
hyundai	tiburon	2.0	1999	4	manual(m5)	f	19	29	r	subcompact
hyundai	tiburon	2.0	2008	4	manual(m5)	f	20	28	r	subcompact
hyundai	tiburon	2.0	2008	4	auto(l4)	f	20	27	r	subcompact
hyundai	tiburon	2.7	2008	6	auto(l4)	f	17	24	r	subcompact
hyundai	tiburon	2.7	2008	6	manual(m6)	f	16	24	r	subcompact
hyundai	tiburon	2.7	2008	6	manual(m5)	f	17	24	r	subcompact

manufacturer	model	displ	year	cyl	trans	drv	cty	hwy	fl	class
jeep	grand cherokee 4wd	3.0	2008	6	auto(l5)	4	17	22	d	suv
jeep	grand cherokee 4wd	3.7	2008	6	auto(l5)	4	15	19	r	suv
jeep	grand cherokee 4wd	4.0	1999	6	auto(l4)	4	15	20	r	suv
jeep	grand cherokee 4wd	4.7	1999	8	auto(l4)	4	14	17	r	suv
jeep	grand cherokee 4wd	4.7	2008	8	auto(l5)	4	9	12	e	suv
jeep	grand cherokee 4wd	4.7	2008	8	auto(l5)	4	14	19	r	suv
jeep	grand cherokee 4wd	5.7	2008	8	auto(l5)	4	13	18	r	suv
jeep	grand cherokee 4wd	6.1	2008	8	auto(l5)	4	11	14	p	suv
land rover	range rover	4.0	1999	8	auto(l4)	4	11	15	p	suv
land rover	range rover	4.2	2008	8	auto(s6)	4	12	18	r	suv
land rover	range rover	4.4	2008	8	auto(s6)	4	12	18	r	suv
land rover	range rover	4.6	1999	8	auto(l4)	4	11	15	p	suv
lincoln	navigator 2wd	5.4	1999	8	auto(l4)	r	11	17	r	suv
lincoln	navigator 2wd	5.4	1999	8	auto(l4)	r	11	16	p	suv
lincoln	navigator 2wd	5.4	2008	8	auto(l6)	r	12	18	r	suv
mercury	mountaineer 4wd	4.0	1999	6	auto(l5)	4	14	17	r	suv
mercury	mountaineer 4wd	4.0	2008	6	auto(l5)	4	13	19	r	suv
mercury	mountaineer 4wd	4.6	2008	8	auto(l6)	4	13	19	r	suv
mercury	mountaineer 4wd	5.0	1999	8	auto(l4)	4	13	17	r	suv
nissan	altima	2.4	1999	4	manual(m5)	f	21	29	r	compact
nissan	altima	2.4	1999	4	auto(l4)	f	19	27	r	compact
nissan	altima	2.5	2008	4	auto(av)	f	23	31	r	midsize
nissan	altima	2.5	2008	4	manual(m6)	f	23	32	r	midsize
nissan	altima	3.5	2008	6	manual(m6)	f	19	27	p	midsize
nissan	altima	3.5	2008	6	auto(av)	f	19	26	p	midsize
nissan	maxima	3.0	1999	6	auto(l4)	f	18	26	r	midsize
nissan	maxima	3.0	1999	6	manual(m5)	f	19	25	r	midsize
nissan	maxima	3.5	2008	6	auto(av)	f	19	25	p	midsize
nissan	pathfinder 4wd	3.3	1999	6	auto(l4)	4	14	17	r	suv
nissan	pathfinder 4wd	3.3	1999	6	manual(m5)	4	15	17	r	suv
nissan	pathfinder 4wd	4.0	2008	6	auto(l5)	4	14	20	p	suv
nissan	pathfinder 4wd	5.6	2008	8	auto(s5)	4	12	18	p	suv
pontiac	grand prix	3.1	1999	6	auto(l4)	f	18	26	r	midsize
pontiac	grand prix	3.8	1999	6	auto(l4)	f	16	26	p	midsize
pontiac	grand prix	3.8	1999	6	auto(l4)	f	17	27	r	midsize
pontiac	grand prix	3.8	2008	6	auto(l4)	f	18	28	r	midsize
pontiac	grand prix	5.3	2008	8	auto(s4)	f	16	25	p	midsize
subaru	forester awd	2.5	1999	4	manual(m5)	4	18	25	r	suv
subaru	forester awd	2.5	1999	4	auto(l4)	4	18	24	r	suv
subaru	forester awd	2.5	2008	4	manual(m5)	4	20	27	r	suv
subaru	forester awd	2.5	2008	4	manual(m5)	4	19	25	p	suv
subaru	forester awd	2.5	2008	4	auto(l4)	4	20	26	r	suv
subaru	forester awd	2.5	2008	4	auto(l4)	4	18	23	p	suv
subaru	impreza awd	2.2	1999	4	auto(l4)	4	21	26	r	subcompact
subaru	impreza awd	2.2	1999	4	manual(m5)	4	19	26	r	subcompact
subaru	impreza awd	2.5	1999	4	manual(m5)	4	19	26	r	subcompact

manufacturer	model	displ	year	cyl	trans	drv	cty	hwy	fl	class
subaru	impreza awd	2.5	1999	4	auto(l4)	4	19	26	r	subcompact
subaru	impreza awd	2.5	2008	4	auto(s4)	4	20	25	p	compact
subaru	impreza awd	2.5	2008	4	auto(s4)	4	20	27	r	compact
subaru	impreza awd	2.5	2008	4	manual(m5)	4	19	25	p	compact
subaru	impreza awd	2.5	2008	4	manual(m5)	4	20	27	r	compact
toyota	4runner 4wd	2.7	1999	4	manual(m5)	4	15	20	r	suv
toyota	4runner 4wd	2.7	1999	4	auto(l4)	4	16	20	r	suv
toyota	4runner 4wd	3.4	1999	6	auto(l4)	4	15	19	r	suv
toyota	4runner 4wd	3.4	1999	6	manual(m5)	4	15	17	r	suv
toyota	4runner 4wd	4.0	2008	6	auto(l5)	4	16	20	r	suv
toyota	4runner 4wd	4.7	2008	8	auto(l5)	4	14	17	r	suv
toyota	camry	2.2	1999	4	manual(m5)	f	21	29	r	midsize
toyota	camry	2.2	1999	4	auto(l4)	f	21	27	r	midsize
toyota	camry	2.4	2008	4	manual(m5)	f	21	31	r	midsize
toyota	camry	2.4	2008	4	auto(l5)	f	21	31	r	midsize
toyota	camry	3.0	1999	6	auto(l4)	f	18	26	r	midsize
toyota	camry	3.0	1999	6	manual(m5)	f	18	26	r	midsize
toyota	camry	3.5	2008	6	auto(s6)	f	19	28	r	midsize
toyota	camry solara	2.2	1999	4	auto(l4)	f	21	27	r	compact
toyota	camry solara	2.2	1999	4	manual(m5)	f	21	29	r	compact
toyota	camry solara	2.4	2008	4	manual(m5)	f	21	31	r	compact
toyota	camry solara	2.4	2008	4	auto(s5)	f	22	31	r	compact
toyota	camry solara	3.0	1999	6	auto(l4)	f	18	26	r	compact
toyota	camry solara	3.0	1999	6	manual(m5)	f	18	26	r	compact
toyota	camry solara	3.3	2008	6	auto(s5)	f	18	27	r	compact
toyota	corolla	1.8	1999	4	auto(l3)	f	24	30	r	compact
toyota	corolla	1.8	1999	4	auto(l4)	f	24	33	r	compact
toyota	corolla	1.8	1999	4	manual(m5)	f	26	35	r	compact
toyota	corolla	1.8	2008	4	manual(m5)	f	28	37	r	compact
toyota	corolla	1.8	2008	4	auto(l4)	f	26	35	r	compact
toyota	land cruiser wagon 4wd	4.7	1999	8	auto(l4)	4	11	15	r	suv
toyota	land cruiser wagon 4wd	5.7	2008	8	auto(s6)	4	13	18	r	suv
toyota	toyota tacoma 4wd	2.7	1999	4	manual(m5)	4	15	20	r	pickup
toyota	toyota tacoma 4wd	2.7	1999	4	auto(l4)	4	16	20	r	pickup
toyota	toyota tacoma 4wd	2.7	2008	4	manual(m5)	4	17	22	r	pickup
toyota	toyota tacoma 4wd	3.4	1999	6	manual(m5)	4	15	17	r	pickup
toyota	toyota tacoma 4wd	3.4	1999	6	auto(l4)	4	15	19	r	pickup
toyota	toyota tacoma 4wd	4.0	2008	6	manual(m6)	4	15	18	r	pickup
toyota	toyota tacoma 4wd	4.0	2008	6	auto(l5)	4	16	20	r	pickup
volkswagen	gti	2.0	1999	4	manual(m5)	f	21	29	r	compact
volkswagen	gti	2.0	1999	4	auto(l4)	f	19	26	r	compact
volkswagen	gti	2.0	2008	4	manual(m6)	f	21	29	p	compact
volkswagen	gti	2.0	2008	4	auto(s6)	f	22	29	p	compact
volkswagen	gti	2.8	1999	6	manual(m5)	f	17	24	r	compact
volkswagen	jetta	1.9	1999	4	manual(m5)	f	33	44	d	compact
volkswagen	jetta	2.0	1999	4	manual(m5)	f	21	29	r	compact

manufacturer	model	displ	year	cyl	trans	drv	cty	hwy	fl	class
volkswagen	jetta	2.0	1999	4	auto(l4)	f	19	26	r	compact
volkswagen	jetta	2.0	2008	4	auto(s6)	f	22	29	p	compact
volkswagen	jetta	2.0	2008	4	manual(m6)	f	21	29	p	compact
volkswagen	jetta	2.5	2008	5	auto(s6)	f	21	29	r	compact
volkswagen	jetta	2.5	2008	5	manual(m5)	f	21	29	r	compact
volkswagen	jetta	2.8	1999	6	auto(l4)	f	16	23	r	compact
volkswagen	jetta	2.8	1999	6	manual(m5)	f	17	24	r	compact
volkswagen	new beetle	1.9	1999	4	manual(m5)	f	35	44	d	subcompact
volkswagen	new beetle	1.9	1999	4	auto(l4)	f	29	41	d	subcompact
volkswagen	new beetle	2.0	1999	4	manual(m5)	f	21	29	r	subcompact
volkswagen	new beetle	2.0	1999	4	auto(l4)	f	19	26	r	subcompact
volkswagen	new beetle	2.5	2008	5	manual(m5)	f	20	28	r	subcompact
volkswagen	new beetle	2.5	2008	5	auto(s6)	f	20	29	r	subcompact
volkswagen	passat	1.8	1999	4	manual(m5)	f	21	29	p	midsize
volkswagen	passat	1.8	1999	4	auto(l5)	f	18	29	p	midsize
volkswagen	passat	2.0	2008	4	auto(s6)	f	19	28	p	midsize
volkswagen	passat	2.0	2008	4	manual(m6)	f	21	29	p	midsize
volkswagen	passat	2.8	1999	6	auto(l5)	f	16	26	p	midsize
volkswagen	passat	2.8	1999	6	manual(m5)	f	18	26	p	midsize
volkswagen	passat	3.6	2008	6	auto(s6)	f	17	26	p	midsize

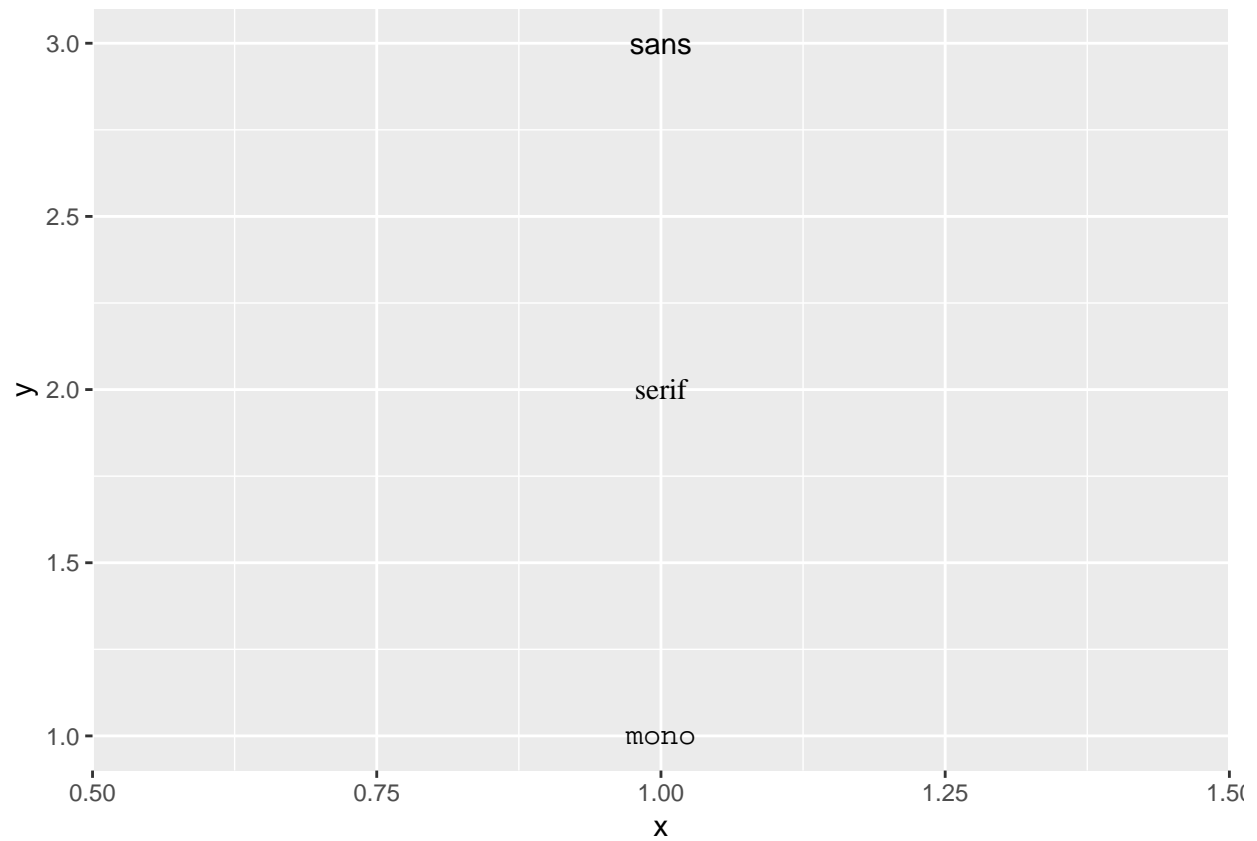
1 Intro 1

1.1 Sub 1

1.1.1 Section 1

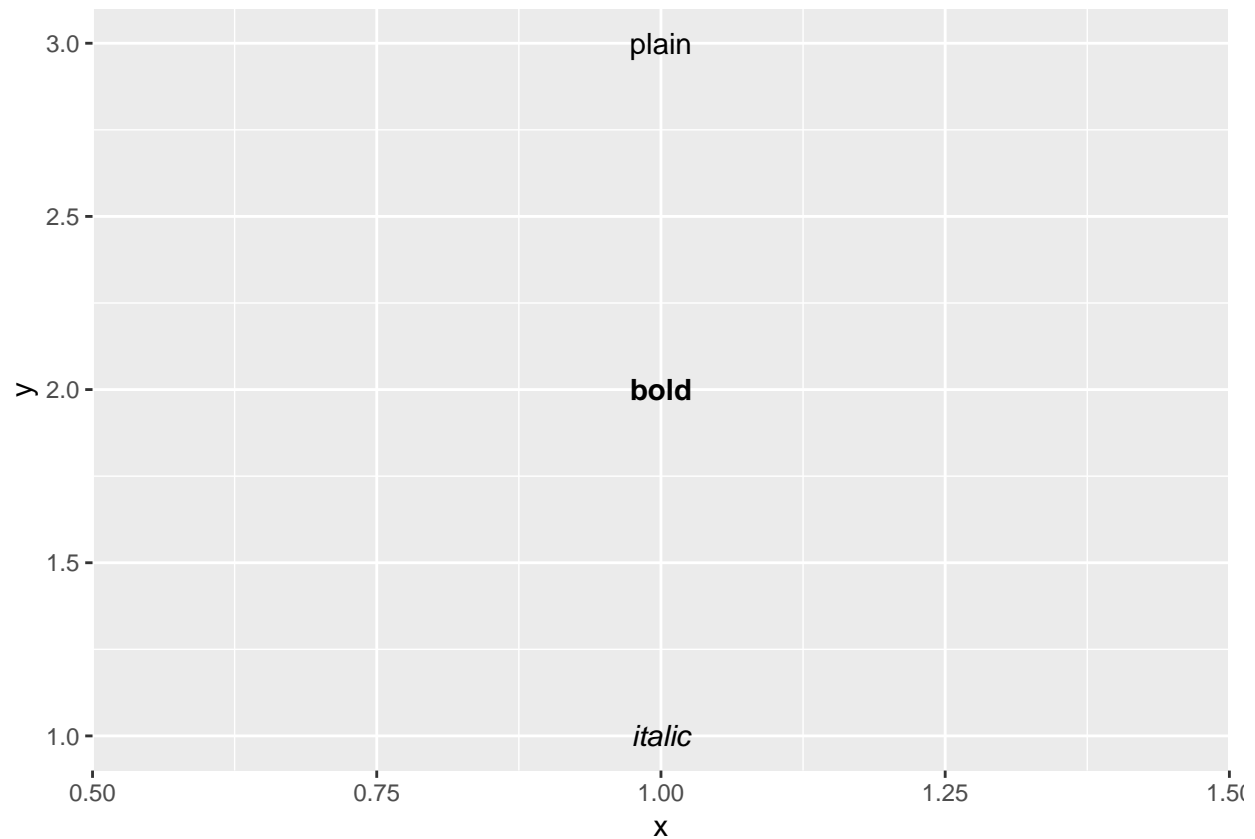
```
df <- data.frame(x = 1, y = 3:1, family = c("sans", "serif", "mono"))

ggplot(df, aes(x, y)) +
  geom_text(aes(label = family, family = family))
```



```
df <- data.frame(x = 1, y = 3:1, face = c("plain", "bold", "italic"))

ggplot(df, aes(x, y)) +
  geom_text(aes(label = face, fontface = face))
```



```
df <- data.frame(x = c(1, 1, 2, 2, 1.5),
                 y = c(1, 2, 1, 2, 1.5),
                 text = c(
                   "bottom-left", "bottom-right",
                   "top-left", "top-right", "center"))
```

2 Intro 2

2.0.1 Exercises 3.2.1

Question 1:

What geoms would you use to draw each of the following named plots?

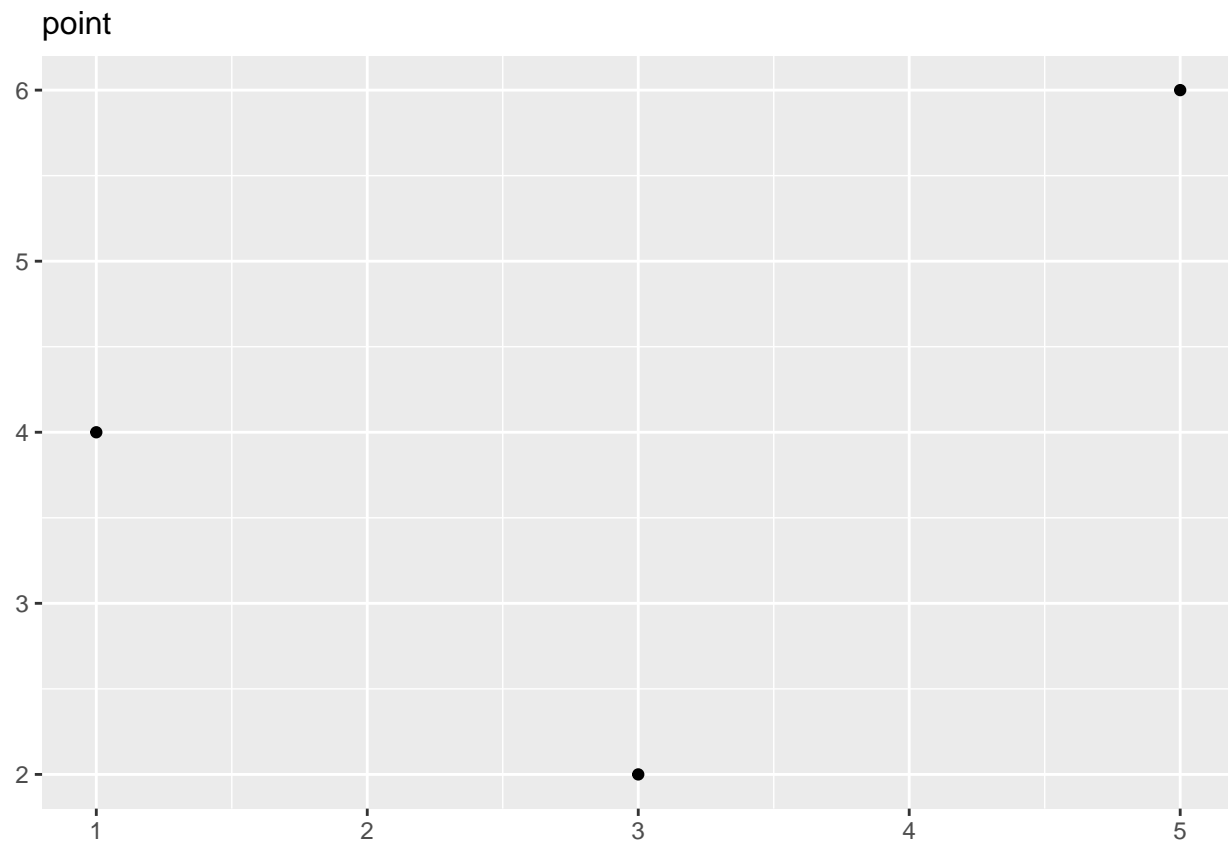
- Scatterplot
- Line Chart
- Histogram
- Bar chart
- Pie Chart

Answer:

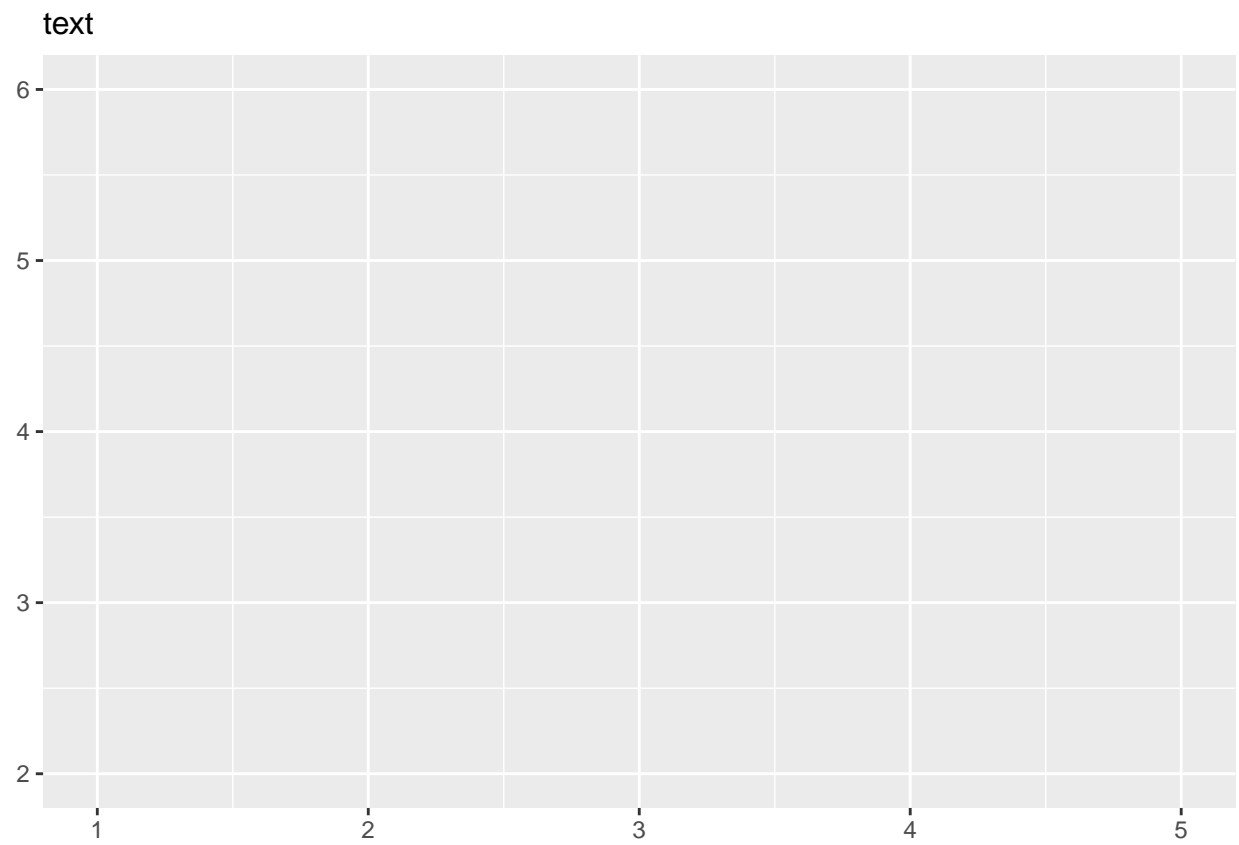

```
df <- data.frame(x = c(3, 1, 5),
                 y = c(2, 4, 6),
                 label = c("a", "b", "c"))

p <- ggplot(df, aes(x, y, label = label)) +
  labs(x = NULL, y = NULL) + # Hide axis label
  theme(plot.title = element_text(size = 12))

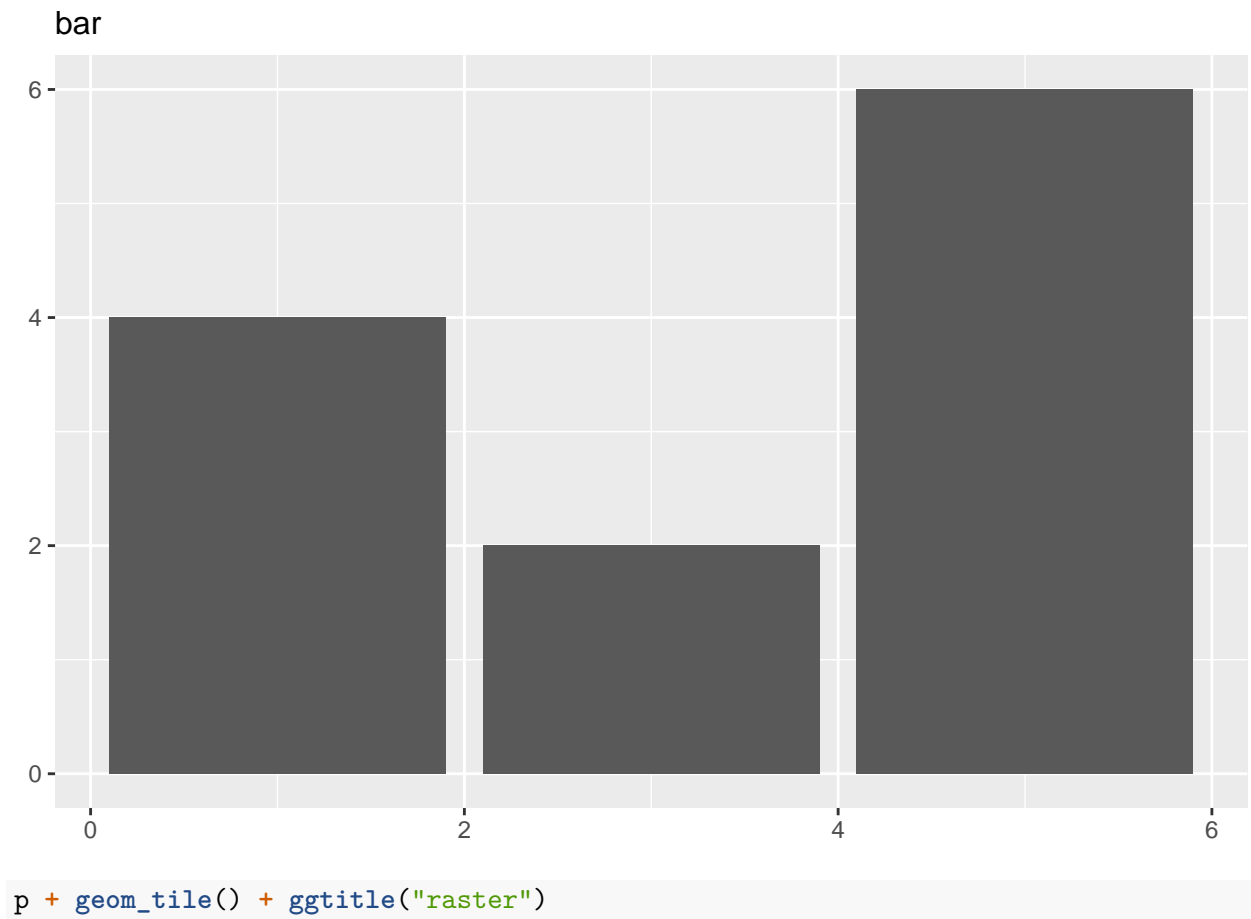
p + geom_point() + ggtitle("point")
```



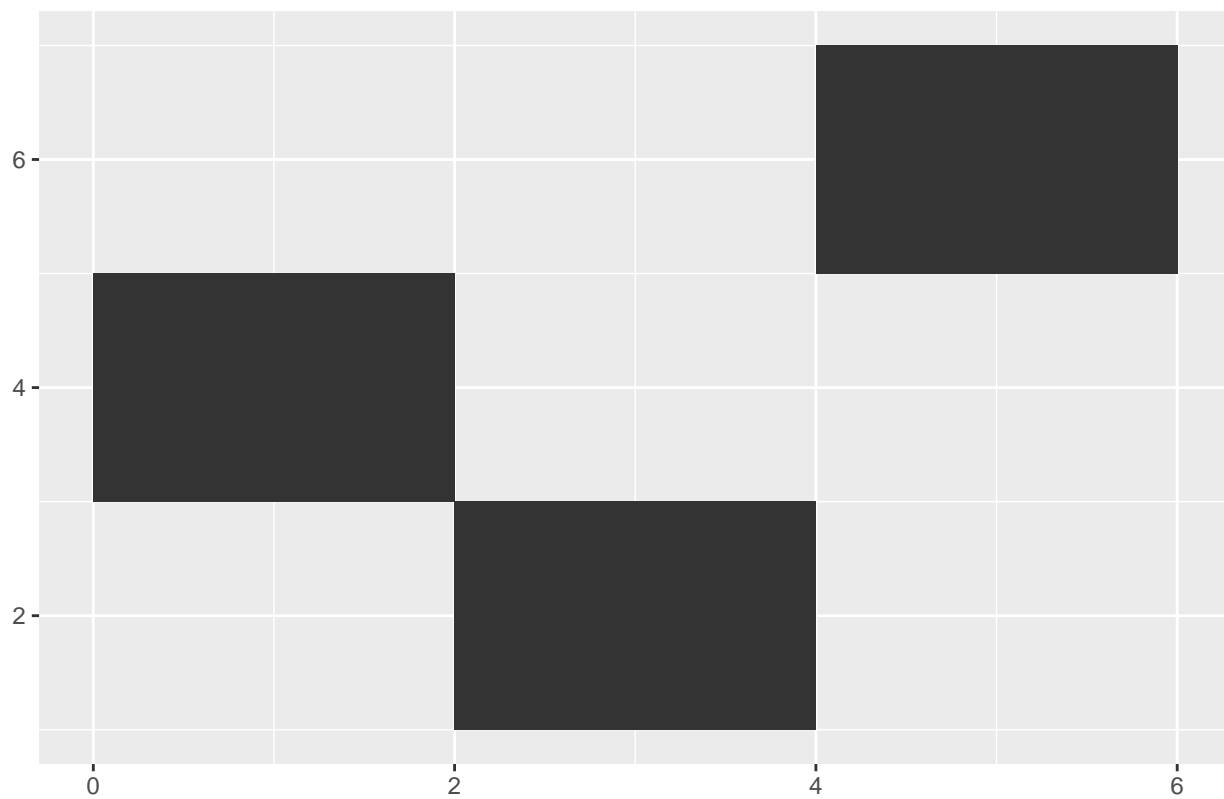
```
p + geom_text(label = "") + ggtitle("text")
```



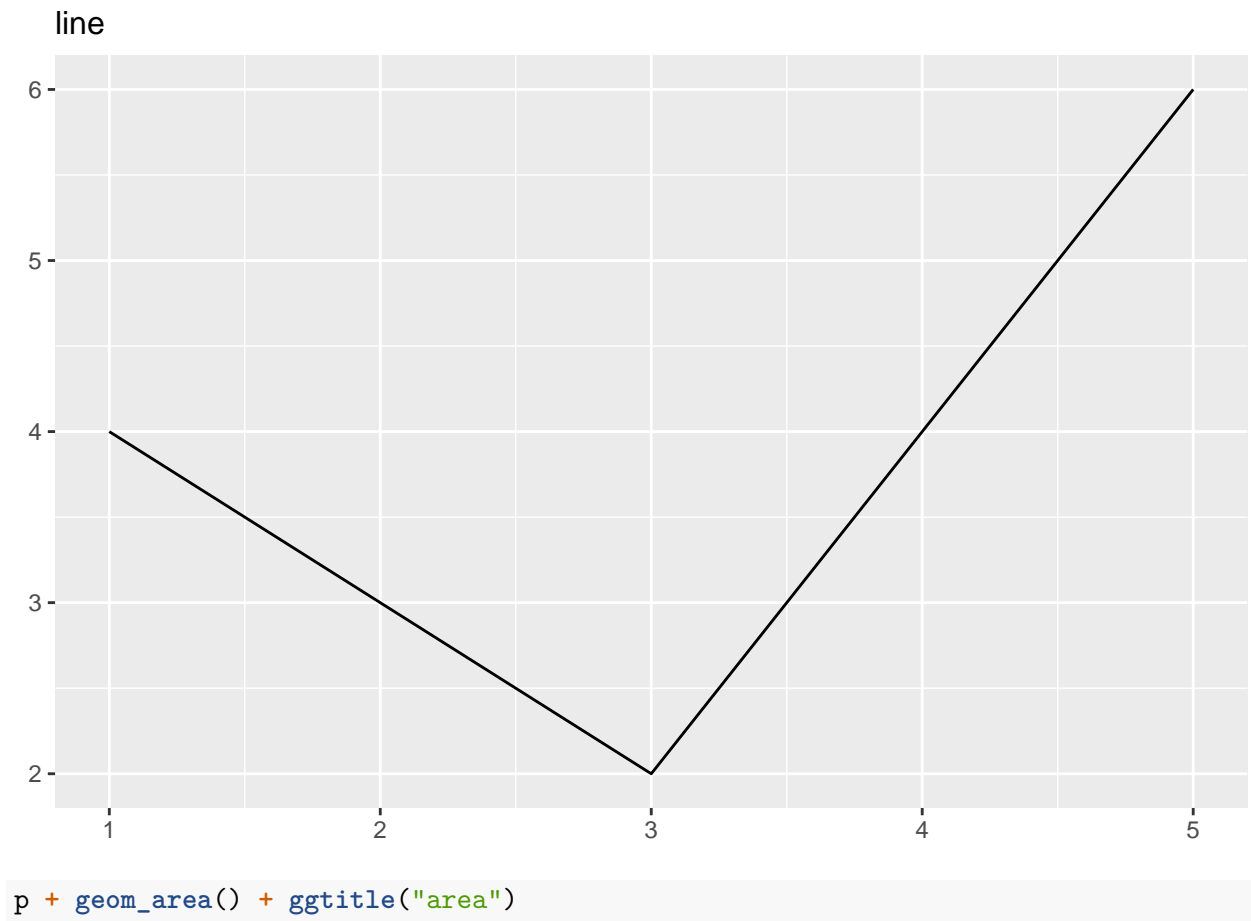
```
p + geom_bar(stat = "identity") + ggtitle("bar")
```

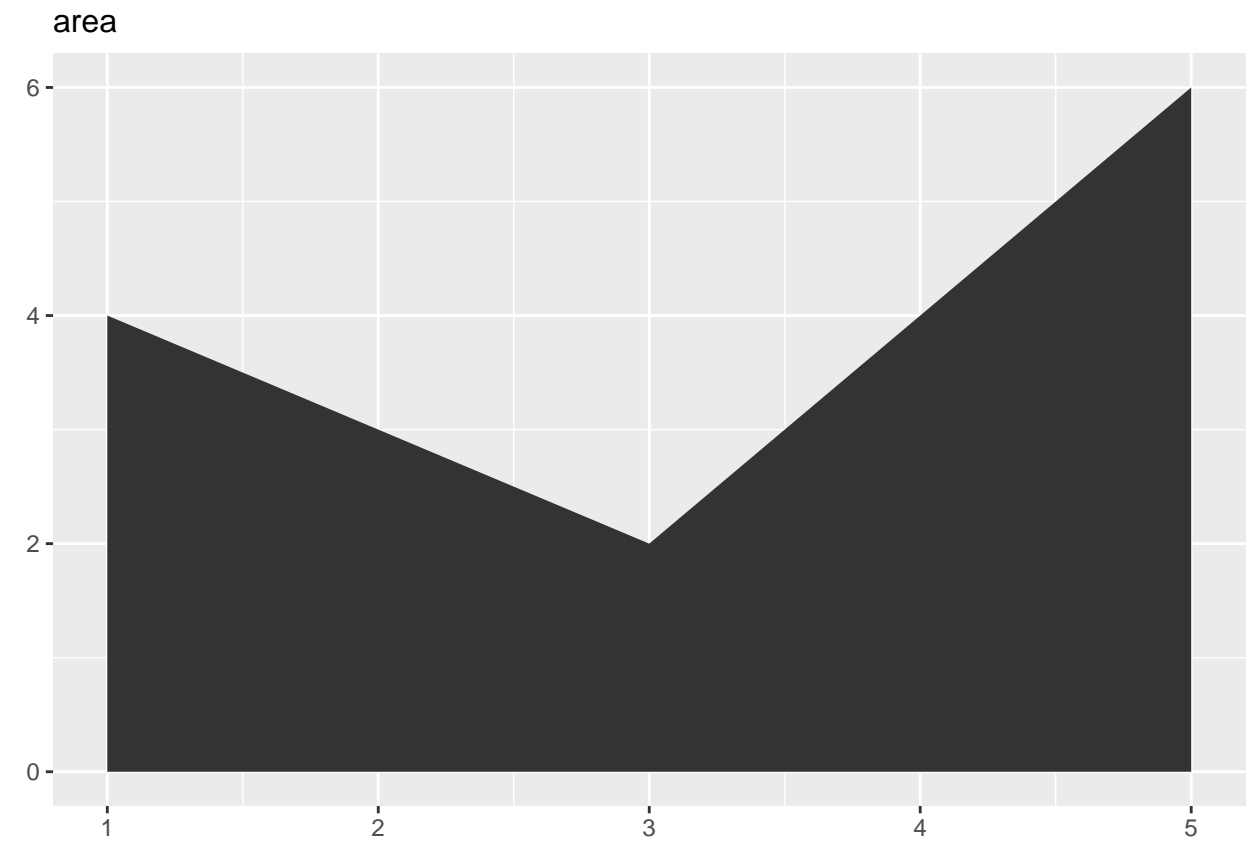


raster

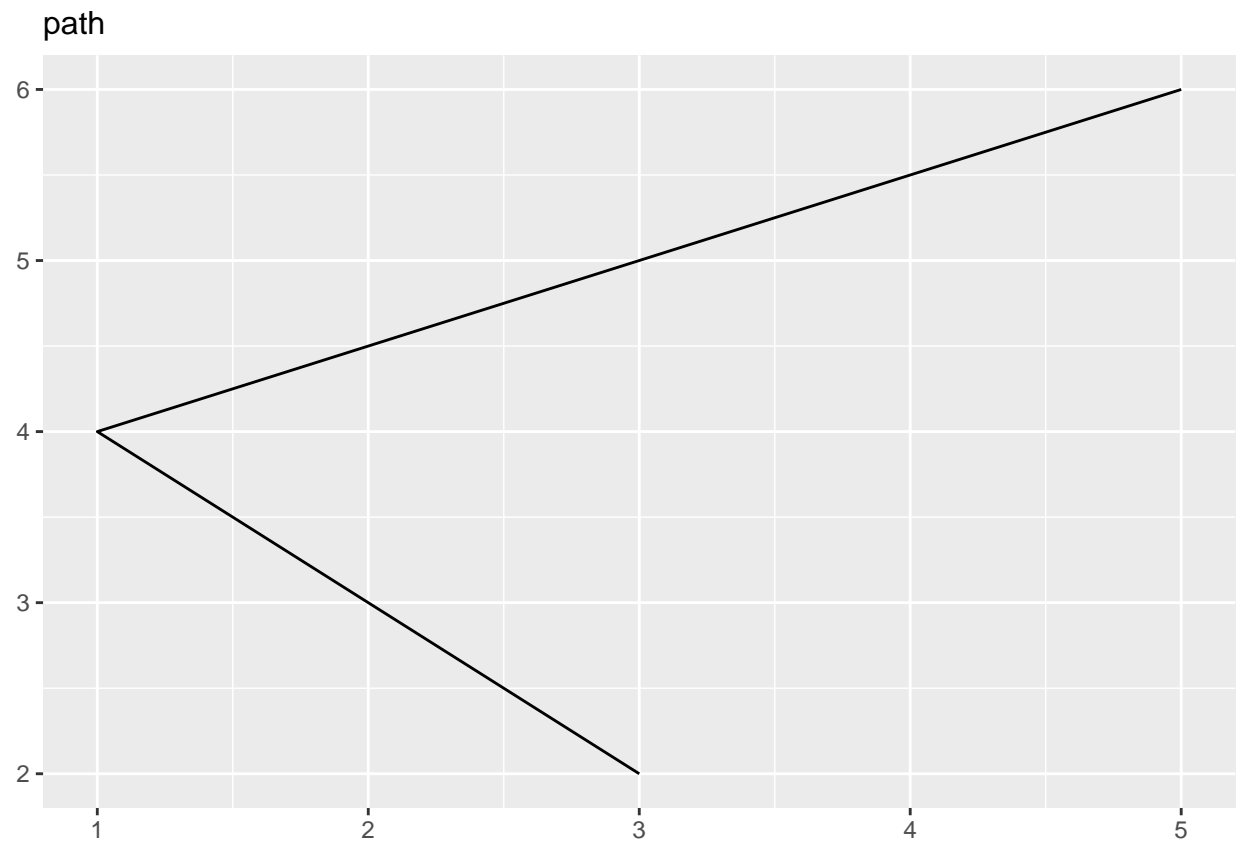


```
p + geom_line() + ggtitle("line")
```





```
p + geom_path() + ggtitle("path")
```



```
p + geom_polygon() + ggtitle("polygon")
```

