MATH1110H-S62-A1-Solutions

June 24, 2026

[1]:
```
# MATH 1110H,  Summer 2026 (S62)
# Solutions to Assignment #1
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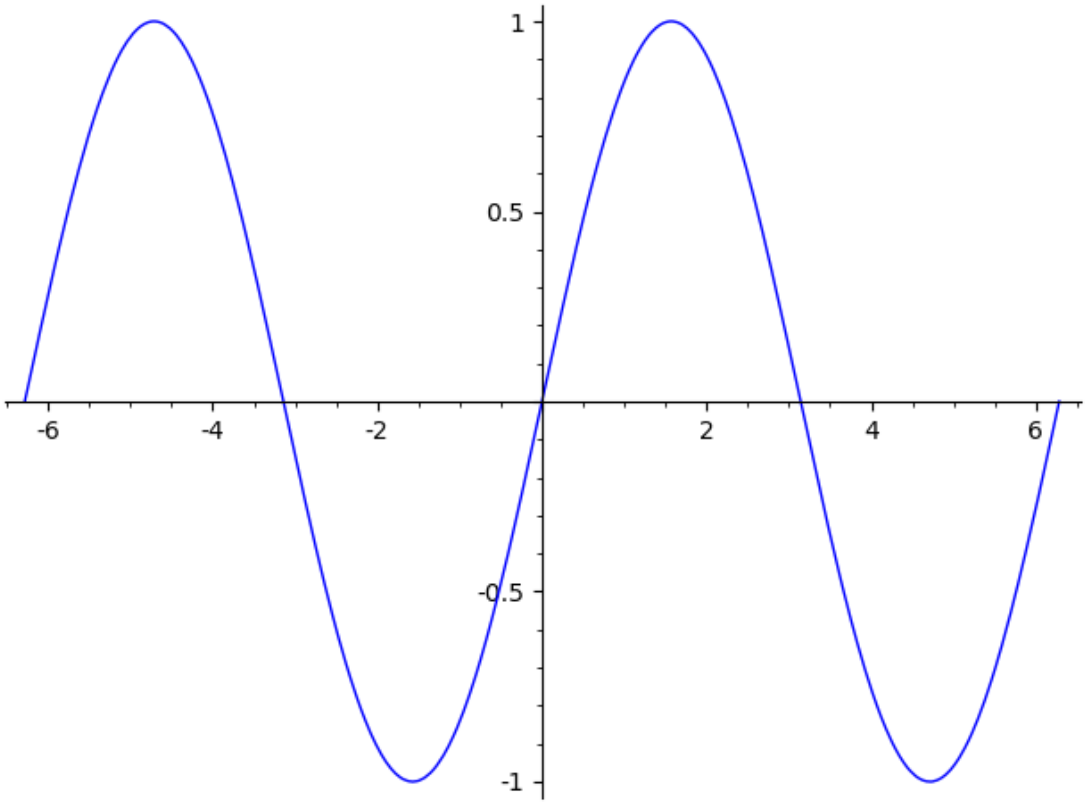
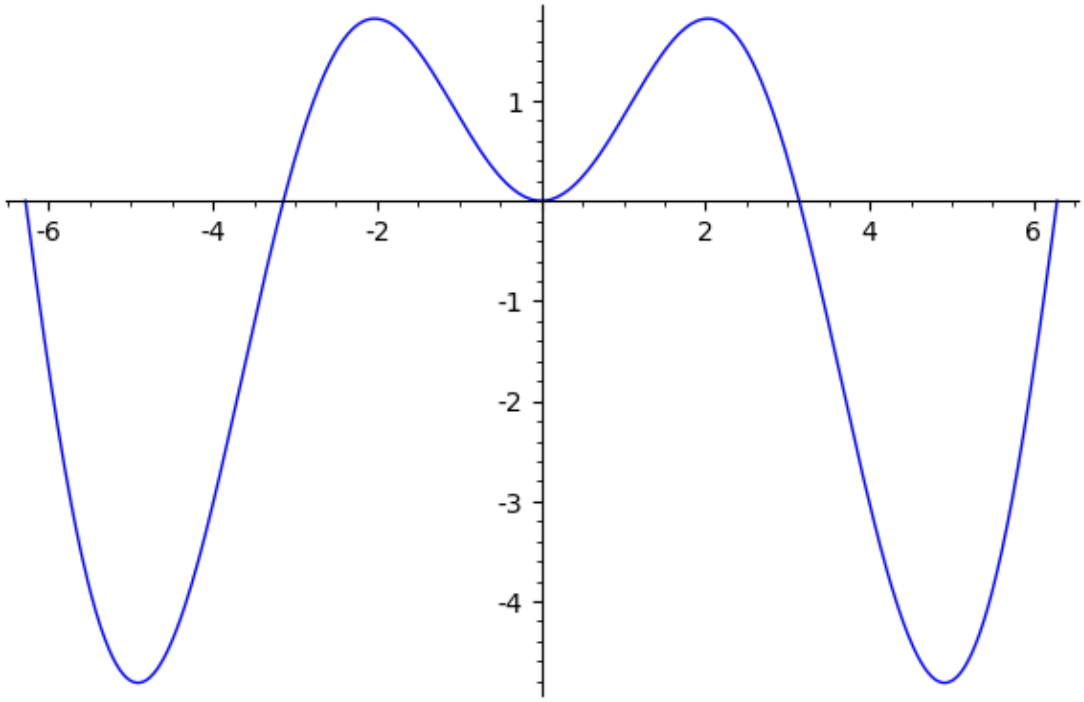
[2]:
```
# 1a
plot( sin(x), -2*pi, 2*pi )
```

[2]:



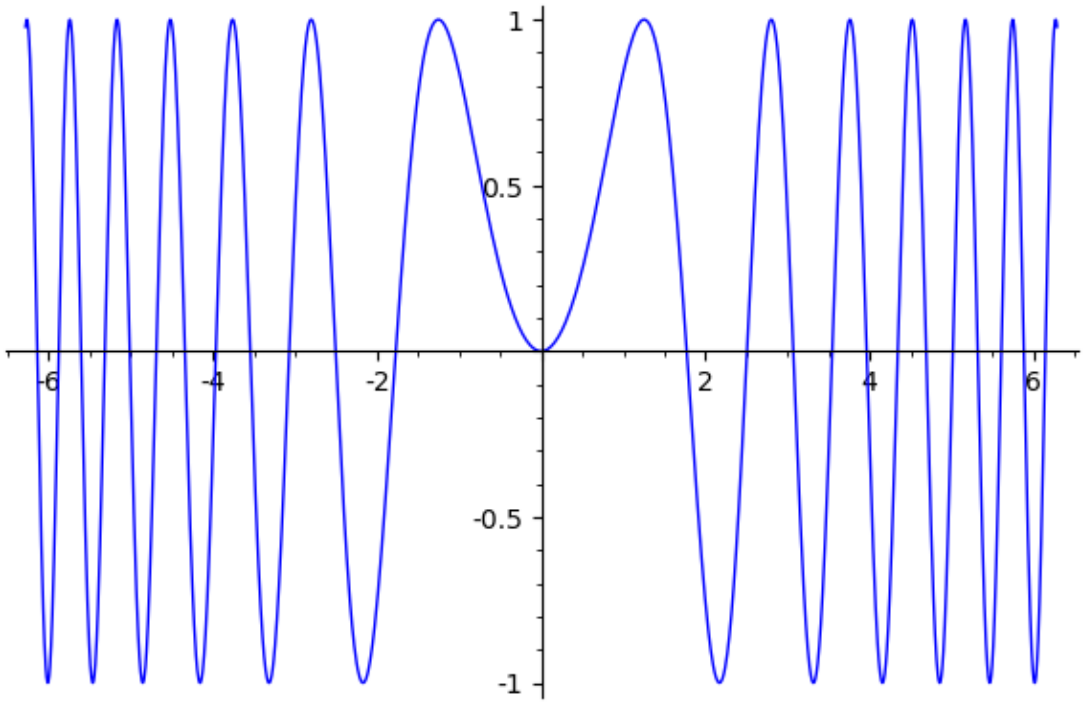
[3]:
```
# 1b
plot( x*sin(x), -2*pi, 2*pi )
```

[3]:



[4]:
```
# 1c
plot( sin(x^2), -2*pi, 2*pi )
```

[4]:



[5]:
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# 1d
plot( x^2*sin(x^2), -2*pi, 2*pi )
```
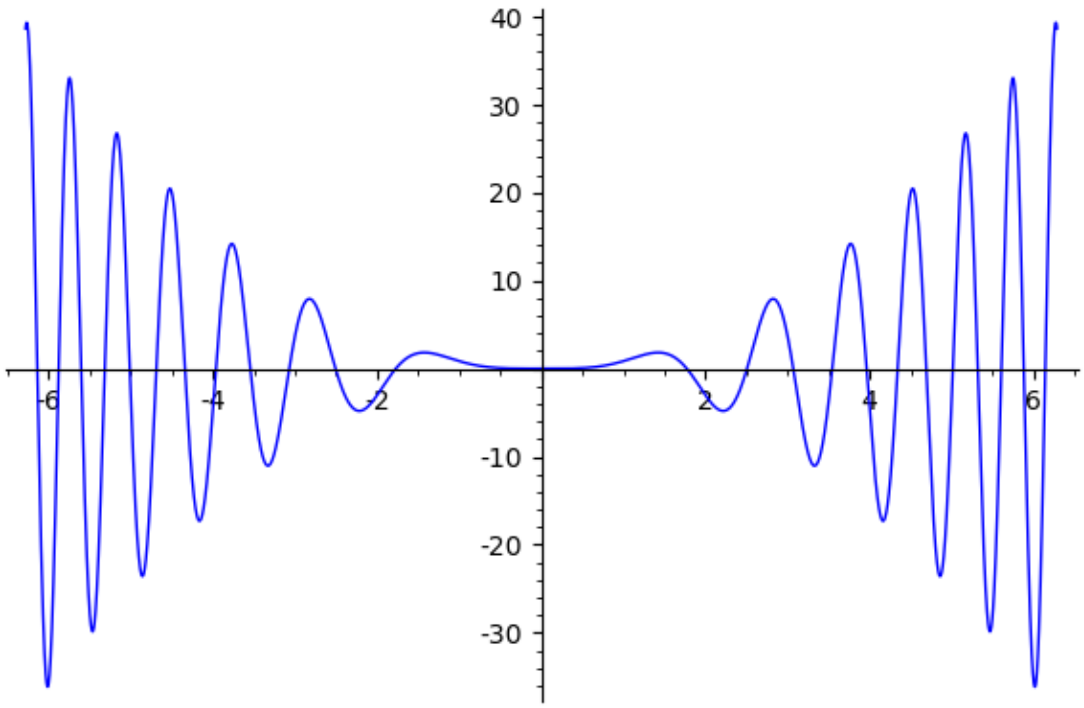
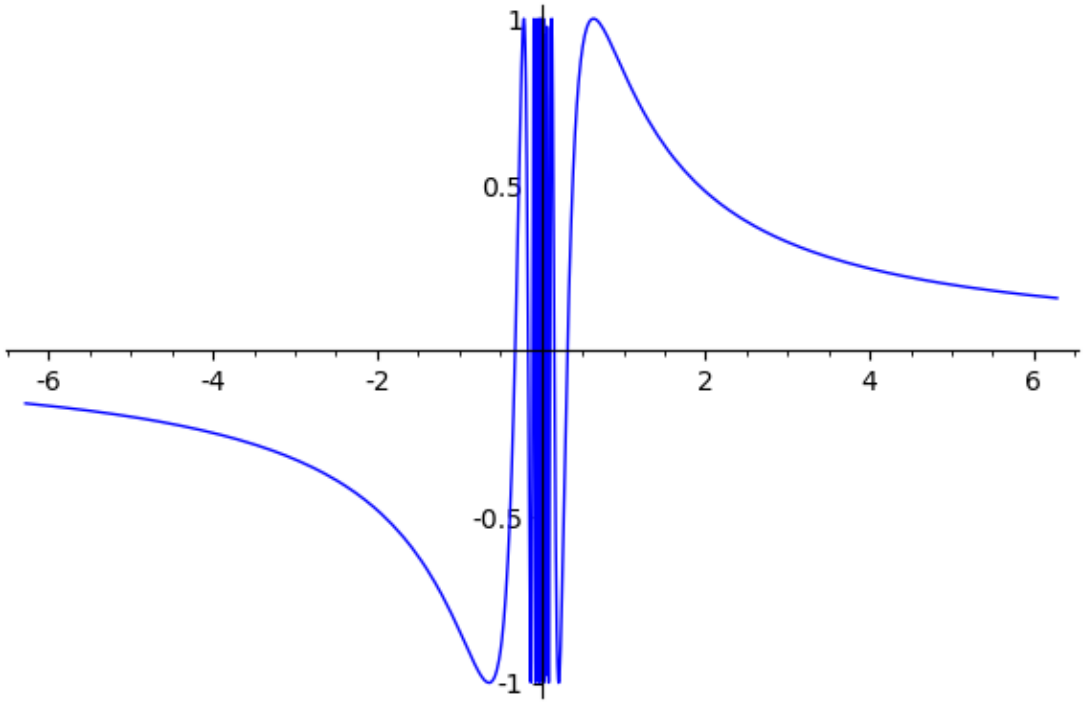

[5]:



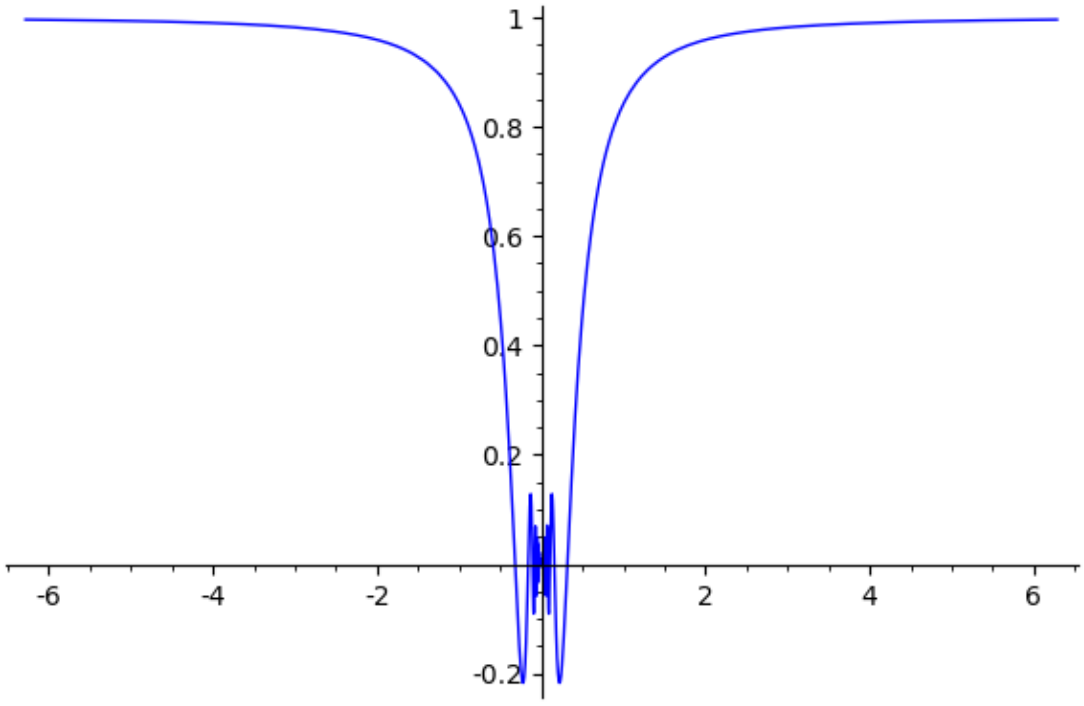
[6]:
```
# 1e
plot( sin(1/x), -2*pi, 2*pi )
```

[6]:



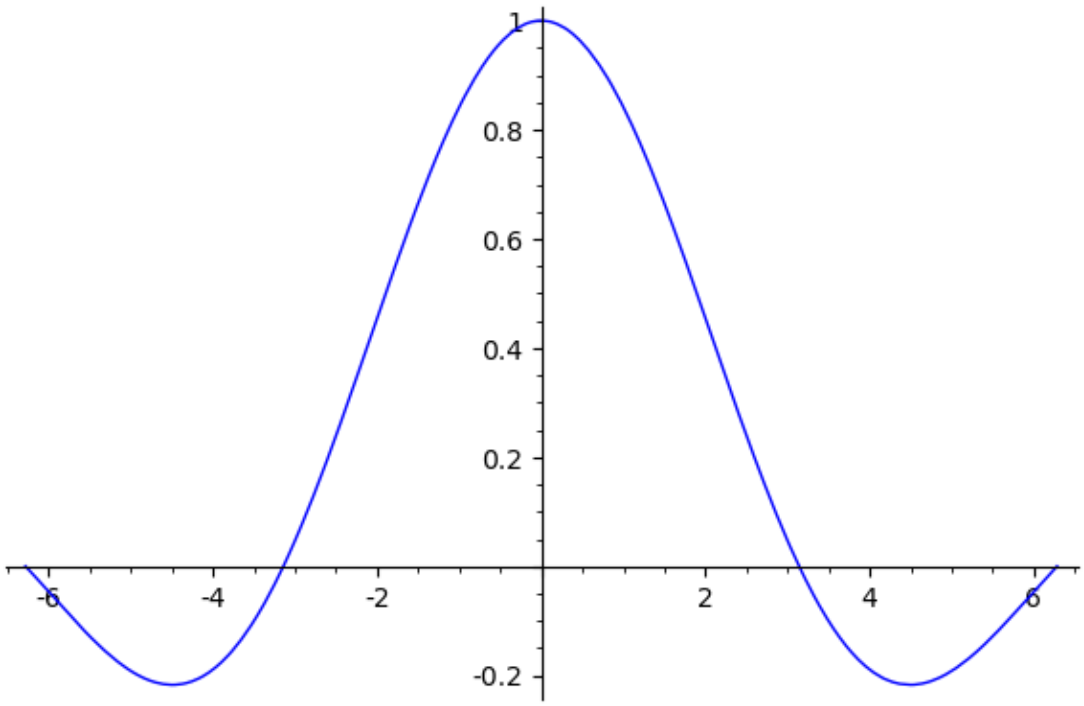
[7]:
```
# 1f
plot( x*sin(1/x), -2*pi, 2*pi )
```

[7]:



[8]:
```
# 1g
plot( (1/x)*sin(x), -2*pi, 2*pi )
```

[8]:



[9]:
```
# 2e
limit( sin(1/x), x=0 )
```

[9]:
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ind
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[10]:
```
# As we can see in the graph for question 1e,  sin(1/x) wiggles between
# -1 and 1 infinitely often as x approaches 0 from either side,  so there
# is no single value for the limit to settle on.  Thus the limit is
# undefined or "indeterminate".
```

[11]:
```
# 2f
limit( x*sin(1/x), x=0 )
```

[11]:
```
0
```

[12]:
```
# As we can see in the graph for question 1f,  while x*sin(1/x) wiggles
# infinitely often as x approaches 0,  the wiggles get ever smaller and
# approach 0 in magnitude.  Thus the limit is 0.
```

[13]:
```
# 2g
limit( (1/x)*sin(x), x=0 )
```

[13]:
```
1
```

[14]:
```
# As we can see in the graph for question 1g,  (1/x)*sin(x) approaches 1
# as x approaches 0.  A not-quite-rigourous geometrical explanation for
# this limit being 1 was given in class on 2026-06-18.
```