Instructor:

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Vector Differentiation

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with(VectorCalculus) :
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r(t) := ⟨sin(t), cos(t), sin(2 t)⟩
```

$$r := t \mapsto \langle \sin(t), \cos(t), \sin(2\,t) \rangle \quad (1)$$

```
diff(r(t), t)
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$$(\cos(t))e_x + (-\sin(t))e_y + (2\cos(2\,t))e_z \quad (2)$$

```
g := t→Vector(3, [sin(t), cos(t), sin(2 t)])
```

$$g := t \mapsto Vector(3, [\sin(t), \cos(t), \sin(2\,t)]) \quad (3)$$

```
diff(g(t), t)
```

$$(\cos(t))e_x + (-\sin(t))e_y + (2\cos(2\,t))e_z \quad (4)$$

Integration by int( ) or integrate( )

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f := x→x^2 + 5
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$$f := x \mapsto x^2 + 5 \quad (5)$$

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integrate(f(x), x)
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$$\frac{1}{3}x^3 + 5x \quad (6)$$

```
integrate(f(x), x = 0..2)
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$$\frac{38}{3} \quad (7)$$

```
int(f(x), x)
```

$$\frac{1}{3}x^3 + 5x \quad (8)$$

```
int(sin(x) csc(x), x = π..2 π)
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$$\pi \quad (9)$$

Analytic geometry of straight line

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with(Student[Precalculus]) :
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Distance([1, 2], [0, 5])
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$$\sqrt{10} \quad (10)$$

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Distance([a, b], [c, d])
```

$$\sqrt{(a-c)^2+(b-d)^2} \tag{11}$$

```
with(geometry):
point(A, 1, 2), point(B, 0, 5):
 distance(A, B)
```

$$\sqrt{10} \tag{12}$$

Equation of line between two points

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point(A, 1, 2), point(B, 0, 5):
 line(l, [A, B])
```

$$l \tag{13}$$

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Equation(l, [x, y])
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$$5-3x-y=0 \tag{14}$$

Equation of line

Line having slope is -4 and y intercept is -6

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with(Student[Precalculus]):
Line(-4, -6)
```

$$y=-4x-6,\ -4,\ -6,\ -\frac{3}{2} \tag{15}$$

where last term -3/2 is x intercept

Line with a point A(12,7) and its slope is -1

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Line([12, 7], -1)
```

$$y=-x+19,\ -1,\ 19,\ 19 \tag{16}$$

where y intercept is 19 and x intercept is 19

Line passing two points A(5,0) and B(2,3)

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Line([5, 0], [2, 3])
```

$$y=-x+5,\ -1,\ 5,\ 5 \tag{17}$$