Travis

- Given the PDF, $f(x) = \frac{15}{40}x^2$ for $0 \leq x \leq 2$ and 0 otherwise, can you find the CDF?

$F(x) = \frac{5}{40}x^3 + C$

check $F(2) = \frac{5}{40} \cdot 8 + C$

$= 1 + C$

$= 1$

let $C = 0$

- Given the PDF, $f(x) = \frac{1}{5}$ for $0 \leq x \leq 5$ and 0 otherwise, can you find the CDF?

$F(x) = \frac{1}{5}x + C$

check $F(5) = \frac{1}{5} \cdot 5 + C$

$= 1 + C$

$= 1$

let $C = 0$

- Given the PDF, $f(x) = \frac{1}{6}$ for $1 \leq x \leq 7$ and 0 otherwise, can you find the CDF?

$F(x) = \frac{1}{6}x + C$

$F(7) = \frac{7}{6} + C = 1$

solve $C = -\frac{1}{6}$

Untitled-1

```
In[1]:= f = Sqrt[16 - x^2]
        a = 0
        b = 4
        Integrate[f, {x, a, b}]
```

Out[1]= $\sqrt{16 - x^2}$

Out[2]= 0

Out[3]= 4

Out[4]= 4π

```
In[5]:= f = Sqrt[25 - (x - 5)^2]
        a = 0
        b = 10
        Integrate[f, {x, a, b}]
```

Out[5]= $\sqrt{25 - (-5 + x)^2}$

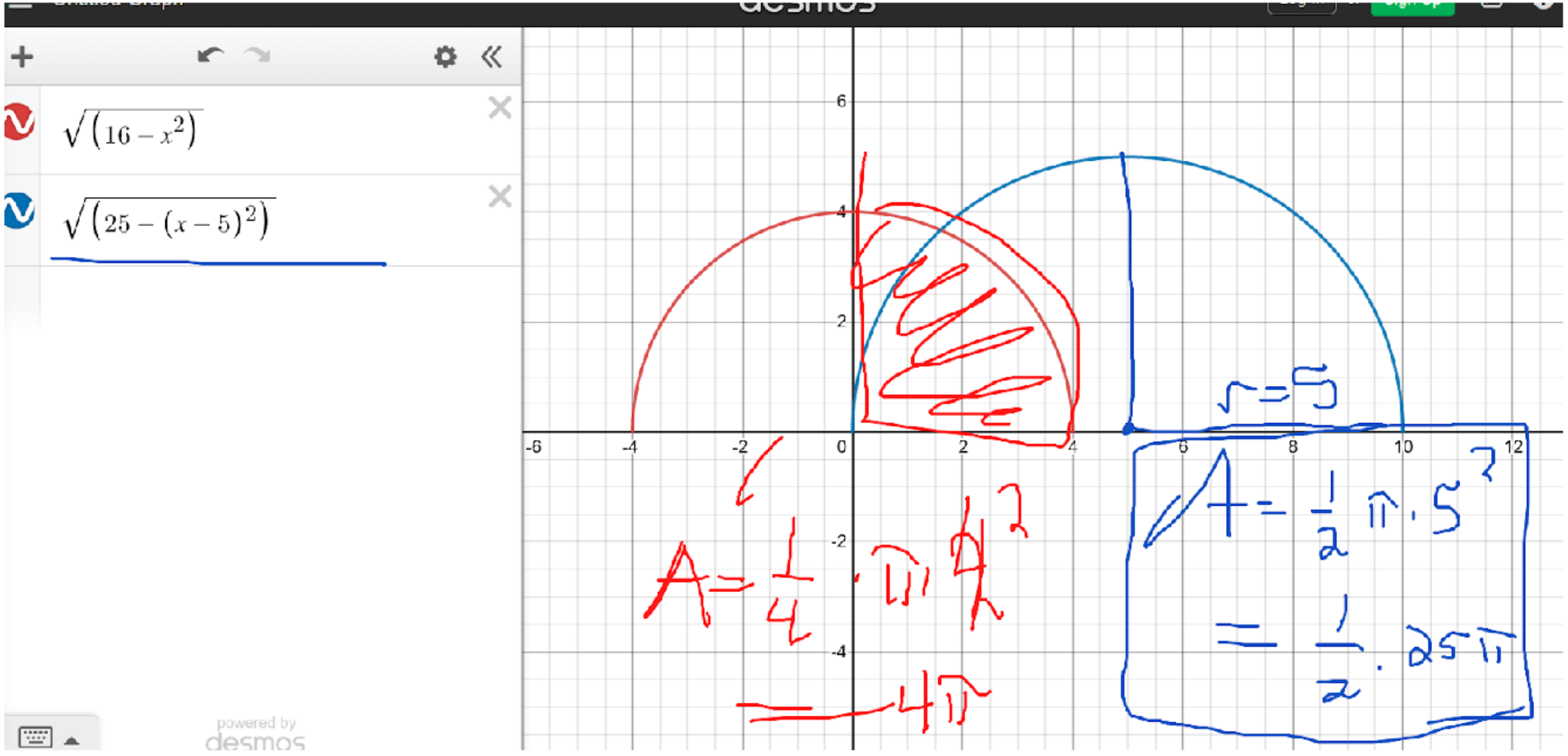
Out[6]= 0

Out[7]= 10

Out[8]= $\frac{25\pi}{2}$

Assuming an angle | Use as *a generic number* instead

express as | degree measure | sine | convert to (degrees, minute


$\sqrt{\left(16-x^2\right)}$
$\sqrt{\left(25-(x-5)^2\right)}$
powered by desmos
6
4
2
-2
-4
-6
-4
-2
0
2
4
6
8
10
12
$A=\frac{1}{4}\cdot\pi\cdot 4^2$
$=4\pi$
$r=5$
$A=\frac{1}{2}\pi\cdot 5^2$
$=\frac{1}{2}\cdot 25\pi$

Practice: Definite integrals and geometric arguments

Use a geometric (area) argument to find the value of each integral. Check your solution with software.

- $\int_0^4 \sqrt{16 - x^2}\,dx$

Hint

- $\int_0^{10} \sqrt{25 - (x-5)^2}\,dx$

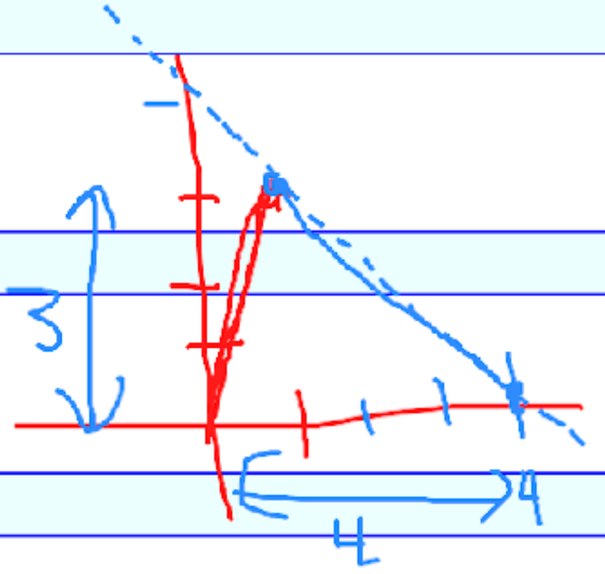
Hint

- $\int_0^4 f(x)dx$ where $f(x) = \begin{cases} 3x & 0 \le x \le 1 \\ 4 - x & 1 \le x \le 4 \end{cases}$

Hint

- $\int_2^5 7dx$

Hint



$b = 4$

$h = 3$

$\frac{1}{2} \cdot b \cdot h = \frac{1}{2} \cdot 4 \cdot 3$

$= 6$

$A = 7 \cdot 3 = 21$

Method of Moments

d value and variance from the di:

$$E[X] = \frac{\alpha}{\beta} \text{ and } \mathrm{Var}[X] = \frac{\alpha}{\beta^2}.$$

```
> mean(Ng)
[1] 2.79164
> var(Ng)
[1] 10.97915
```

Project 3 Task 2

Solve

$\frac{\alpha}{\beta} = m$ $\quad \frac{\alpha}{\beta^2} = V$ for α and β.

$\alpha = m \cdot \beta$

$\alpha = V \cdot \beta^2$

$m \cdot \beta = V \cdot \beta^2$

$\frac{m}{\beta} = V \cdot \frac{\beta^2}{\beta}$ $\rightarrow$ $m = V\beta$

$\alpha = \frac{m^2}{V}$ $\quad \beta = \frac{m}{V}$

CURRENT OBJECTIVE

Compute probability using a continuous probability density function

Question

Consider the probability density function $f(x)$ defined by

$$f(x) = \begin{cases} \frac{1}{4} & \text{for } 0 \le x \le 2, \\ \frac{1}{4}(2x-3) & \text{for } 2 < x \le 3, \\ 0 & \text{otherwise.} \end{cases}$$

Calculate $P(X < 2.5)$. Give your answer to two decimal places.

Provide your answer below:

[18]:
```
f = 1 / 4;
a = 0;
b = 2;
Integrate[f, {x, a, b}]
```

[21]:
$$\frac{1}{2}$$

[22]:
```
f = 1 / 4 * (2 * x - 3);
a = 2;
b = 2.5;
Integrate[f, {x, a, b}]
```

[25]:
```
0.1875
```

[13]:
```
0.5 + 0.1875
```

[13]:
```
0.6875
```

[27]:
```
f = Piecewise[{{1 / 4, 0 ≤ x ≤ 2}, {1 / 4 * (2 * x - 3), 2 ≤ x ≤ 3}}];
a = 0;
b = 2.5;
Integrate[f, {x, a, b}]
```

[30]:
```
0.6875
```

show all digits | scientific form | rational approximation | digits | more...