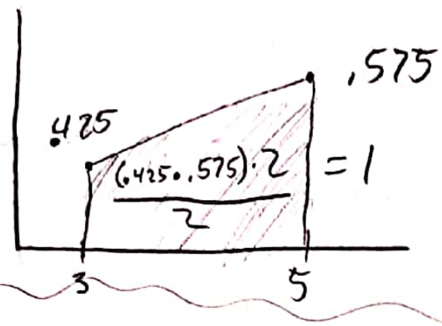
1) a)



$f(3) = .425$
$f(4) = .5$
$f(5) = .575$

b) $P(X \le 4) = (.425 + .5)/2 \cdot 2 = .925$ this is equal to $P(X < 4)$

c) $P(3.5 \le X \le 4.5) = (.4625 + .5375)/2 = .5$

$P(4.5 < X) = (.5375 + .575)/2 = .55625$

2) a) $P(X < 0) = \frac{1}{10} \int dx \quad -5 < x < 0$

$\frac{x}{10}$ from 5 to 10 so then $F(x) = \frac{1}{10}x$

$F(0) - F(-5) = 0 - -\frac{5}{10} = \frac{1}{2}$

b) $F(x) = x/10$

$F(2.5) = \frac{2.5}{10}$

$F(-2.5) = \frac{-2.5}{10}$

$(.25 - -.25) = .5$

c) $F(3) - F(2) = \frac{3}{10} - \frac{2}{10} = \frac{1}{10}$

d) $\frac{k+4}{10} - \frac{k}{10} = \frac{4}{10}$

Scanned with CamScanner

3) a) $\int_0^2$  $= .5$

b) $\int_0^2 .09375(4-x^2) = .5$

c) $\int_{-1}^{1} .09375(4-x^2) = .6875$

d) $\int_{.5}^{2} .09375(4-x^2)dx + \int_{-2}^{-.5} .09375(4-x^2)dx = .6328125$

4) a) $\int_0^\infty f(x,\theta)dx = 1$ Let $\frac{x^2}{2\theta^2} = t$ $\frac{x\,dx}{\theta^2} = dt$

$x=0, t=0$
$x=\infty, t=\infty$

$\int_0^\infty e^{-t}\,dt \Rightarrow \left[-e^{-t}\right]_0^\infty =$

$-e^{-\infty} - (-e^{0}) = \frac{-1}{e^{\infty}} + 1 = 0+1 = 1$

b) $P(x \le 200) = \int_0^{200} \frac{x}{\theta^2} e^{-x^2/2\theta^2}$ eq.

$\int_0^2 e^{-t}\,dt = -e^{-2} - (-e^{0}) = 1-e^{-2}$

$P(x < 200) = 1-e^{-2}$

$P(x > 200) = \underbrace{-e^{-\infty}}_{0} - -e^{-2} = e^{-2}$

$1-(1-e^{-2}) = e^{-2}$

4) c) $\int_{100}^{200} \frac{x}{\theta^2} \cdot e^{x^2/2\theta^2}$ For $x=100$, $t = \frac{x^2}{2\theta^2} = \frac{1}{2}$

For $x=200$, $t = 2$

$\int_{\frac{1}{2}}^{2} e^{-t}\, dt = -e^{-2} - [-e^{-\frac{1}{2}}] = -e^{-2} + e^{-\frac{1}{2}}$

d) $\int_0^n f(x,\theta)\, dx$ $\int_0^x \frac{x}{\theta^2} \cdot e^{-x^2/2\theta^2}\, dx$ Let $t = \frac{x^2}{2\theta^2}$

Let $dt = \frac{x\,dx}{\theta^2}$

$\int_0^{\frac{x^2}{2\theta^2}} e^{-t}\, dt = [-e^{-t}]_0^{\frac{x^2}{2\theta^2}} = (-e^{-x^2/2\theta^2}) - (-e^0)$

or

$1 - e^{-\frac{x^2}{2\theta^2}}$

5) $f(x) = kx^2$ $0 \le x \le 2$

a) $\int_0^2 kx^2\, dx = 1$ $k[\frac{x^3}{3}]_0^2 = 1$

$k\int_0^2 x^2\, dx = 1$ $\frac{8k}{3} = 1$ $\frac{3}{8} = k$

b) $\frac{3}{8}\int_0 x^2\, dx = \frac{3}{8} \cdot \frac{1}{3} = \frac{1}{8} = .125$

$P(X<1) = .125$