

7(a)	$[f(x) = -\frac{3}{4}(x^2 - 8x + 15)]$
	$-\frac{3}{4} \int_{4.5}^5 (x^2 - 8x + 15) dx$
	$= -\frac{3}{4} \left[\frac{x^3}{3} - 4x^2 + 15x \right]_{4.5}^5$
	$-\frac{3}{4} \left[\frac{125}{3} - 100 + 75 - \left(\frac{4.5^3}{3} - 4 \times 4.5^2 + 15 \times 4.5 \right) \right]$
	$= \frac{5}{32} \text{ or } 0.15625 \text{ or } 0.156 \text{ (3 sf)}$
7(b)	Median = 4
7(c)	$1 - 2 \times \left(\frac{5}{32} \right), \text{ or } 2(0.5 - \left(\frac{5}{32} \right))$
	$\frac{11}{16} \text{ or } 0.6875 \text{ or } 0.687 \text{ or } 0.688 \text{ (3 sf)}$

5(a)	$k \int_0^2 (2x^2 - x^3) \, dx = 1$
	$k \left[\frac{2x^3}{3} - \frac{x^4}{4} \right]_0^2 = 1$
	$k \times \frac{4}{3} = 1 \quad k = \frac{3}{4}$
5(b)(i)	0.5
5(b)(ii)	$E(X) = \frac{3}{4} \int_0^2 (2x^3 - x^4) \, dx$
	$= \frac{3}{4} \left[\frac{2x^4}{4} - \frac{x^5}{5} \right]_0^2 = \frac{6}{5}$
	$P(X < E(X)) = \frac{3}{4} \int_0^{1.2} (2x^2 - x^3) \, dx$
	$= \frac{3}{4} \left[\frac{2x^3}{3} - \frac{x^4}{4} \right]_0^{1.2} = \frac{594}{1250} \text{ or } 297/625 \text{ or } 0.4752$
	$P(E(X) \leq X \leq m) = 0.5 - '0.4752'$
	$= 0.0248 \text{ or } 31/1250$

7(a)	$\int_0^{\frac{1}{2}} (1 + \cos \pi x) \, dx$
	$= \left[x + \frac{\sin \pi x}{\pi} \right]_0^{\frac{1}{2}}$
	$= \frac{1}{2} + \frac{\sin \frac{\pi}{2}}{\pi} = \frac{1}{2} + \frac{1}{\pi}$
7(b)	$\int_0^1 (x + x \cos \pi x) \, dx$
	$= \left[\frac{x^2}{2} + x \times \frac{\sin \pi x}{\pi} - \int \frac{\sin \pi x}{\pi} \, dx \right]_0^1$
	$= \left[\frac{x^2}{2} + x \times \frac{\sin \pi x}{\pi} + \frac{\cos \pi x}{\pi^2} \right]_0^1$
	$= \frac{1}{2} + \frac{\sin \pi}{\pi} + \frac{\cos \pi}{\pi^2} - \frac{\cos 0}{\pi^2}$
	$= \frac{1}{2} - \frac{2}{\pi^2}$