

**Answers****Quiz 4**

- (Q4.1) **D** [ use area of triangle; or  $\int_{2.5}^4 \frac{2}{9}(4-t)dt$  ];  
(Q4.2) **B** [ use centre of mass of a triangle; or  $\int_1^4 \frac{2}{9}t(4-t)dt$  ];  
(Q4.3) **E** [  $F(t) = 1 - \frac{1}{9}(1-t)^2$  and  $h(t) = f(t)/(1-F(t))$  ];  
(Q4.4) **A** [  $\text{var}(Z) = \text{var}(X) + \text{var}(Y)$  ];  
(Q4.5) **C** [  $\mu = 0, \sigma = 2; \Pr(X \geq 1) = \Pr(X_s \geq 0.5)$  ].

**Homework 4**

- (4.1) **E** [  $E(Y) = \frac{3}{4}, E(Y^2) = \frac{3}{5}$ ; so  $\text{var}(Y) = \frac{3}{5} - (\frac{3}{4})^2$  ];  
(4.2) **A** [  $E(1/Y) = \frac{3}{2}, E(1/Y^2) = 3$ ; so  $\text{var}(1/Y) = 3 - (\frac{3}{2})^2$  ];  
(4.3) **C** [  $\text{var}(\psi(X)) \approx \psi'(\mu)^2\sigma^2$ , with  $\psi(x) = x^3$ , so  $\psi'(\mu) = 3\mu^2$ ];  
(4.4) **D** [  $H(t) = \int_0^t 3(u-1)^2 du = (t-1)^3 + 1$ , and  $F(t) = 1 - \exp(-H(t))$  ];  
(4.5) **B** [  $\Pr(X > 2 | X > 1.5) = \Pr(X > 2) / \Pr(X > 1.5) = 0.0228 / 0.0668$ . ].
- (4.6) (a) i.  $E(W) = E(X^2)E(Y) = (10^2 + 1) \times 10 = 1010$ , since  $E(X^2) = E(X)^2 + \text{var}(X)$ .  
ii.  $E(W^2) = E(X^4)E(Y^2) \approx (10^4 + \frac{1}{2} \times 12 \times 10^2 \times 1)(10^2 + 1) = 1070600$ ;  
[using the approximation formula for  $E(X^4)$ :  $\psi(x) = x^4 \Rightarrow \psi''(x) = 12x^2$ ]  
 $\text{var}(W) \approx 1070600 - 1010^2 = 50500 \Rightarrow \text{sd}(W) \approx 225$ .
- (b) i.  $\Pr(X > 40) = \Pr(X_s > -1.25) = 0.8944$ .  
ii.  $X-T \stackrel{d}{=} N(5, 5^2)$ ;  $\Pr(X > T) = \Pr(X-T > 0) = \Pr((X-T)_s > -1) = 0.8413$ .