Second Year Assignment Test 6 Version O

1. The first three terms in the binomial expansion of $\frac{1}{\sqrt{a+bx}}$ are $3 + \frac{1}{3}x + \frac{1}{18}x^2 + \ldots$

a) Find the values of the constants a and b

b) Find the coefficient of the x^3 term in the expansion.

2. The random variable $X \sim B(200, 0.53)$. Use a suitable approximation to estimate

a) $P(X < 90)$ b) $P(100 \leq X < 110)$ c) $P(X = 105)$

3. A boat A has a position vector of ($2\mathbf{i} + \mathbf{j}$) km and a buoy B has a position vector of ($6\mathbf{i} - 4\mathbf{j}$) km, relative to a fixed origin O.

a) Find the distance of the boat from the buoy.

b) Find the bearing of the boat from the buoy.

The boat travels with constant velocity ($8\mathbf{i} - 10\mathbf{j}$) km/h.

c) Verify that the boat is travelling directly towards the buoy.

d) Find the speed of the boat.

e) Work out how long it will take the boat to reach the buoy.

Second Year Assignment Test 6 Version P

1. The first three terms in the binomial expansion of $\frac{1}{\sqrt{a+bx}}$ are $4 + \frac{1}{4}x + \frac{3}{128}x^2 + \ldots$

a) Find the values of the constants a and b

b) Find the coefficient of the x^3 term in the expansion.

2. The random variable $X \sim B(200, 0.52)$. Use a suitable approximation to estimate

a) $P(X < 90)$ b) $P(100 \leq X < 110)$ c) $P(X = 105)$

3. A boat A has a position vector of (2**i** + **j**) km and a buoy B has a position vector of (10**i** - 9**j**) km, relative to a fixed origin O.

a) Find the distance of the boat from the buoy.

b) Find the bearing of the boat from the buoy.

The boat travels with constant velocity (4**i** – 5**j**) km/h.

c) Verify that the boat is travelling directly towards the buoy.

d) Find the speed of the boat.

e) Work out how long it will take the boat to reach the buoy.

Second Year Assignment Test 6 Version Q

1. The first three terms in the binomial expansion of $\frac{1}{\sqrt{a+bx}}$ are $2 + \frac{1}{2}x + \frac{3}{16}x^2 + \ldots$
a) Find the values of the constants a and b

b) Find the coefficient of the x^3 term in the expansion.

2. The random variable $X \sim B(200, 0.51)$. Use a suitable approximation to estimate
a) $P(X < 90)$ b) $P(100 \leq X < 110)$ c) $P(X = 105)$

3. A boat A has a position vector of (2**i** + **j**) km and a buoy B has a position vector of
(4**i** − 1.5**j**) km, relative to a fixed origin O.
a) Find the distance of the boat from the buoy.

b) Find the bearing of the boat from the buoy.

The boat travels with constant velocity (2**i** − 2.5**j**) km/h.
c) Verify that the boat is travelling directly towards the buoy.

d) Find the speed of the boat.

e) Work out how long it will take the boat to reach the buoy.

Second Year Assignment Test 6 Version R

1. The first three terms in the binomial expansion of $\frac{1}{\sqrt{a+bx}}$ are $3 + \frac{1}{6}x + \frac{1}{72}x^2 + ...$

a) Find the values of the constants a and b

b) Find the coefficient of the x^3 term in the expansion.

2. The random variable $X \sim B(200, 0.5)$. Use a suitable approximation to estimate

a) $P(X < 90)$ b) $P(100 \leq X < 110)$ c) $P(X = 105)$

3. A boat A has a position vector of (2**i** + **j**) km and a buoy B has a position vector of (42i -49**j**) km, relative to a fixed origin O.

a) Find the distance of the boat from the buoy.

b) Find the bearing of the boat from the buoy.

The boat travels with constant velocity (8**i** – 10**j**) km/h.

c) Verify that the boat is travelling directly towards the buoy.

d) Find the speed of the boat.

e) Work out how long it will take the boat to reach the buoy.

Answers Version O

1. a) $a = \frac{1}{9}, b = -\frac{2}{81}$ b) $\frac{5}{486}$

2. a) 0.0097   b) 0.5115   c) 0.0559

3. a) $\sqrt{41} = 6.403$ km   b) 321.3°   d) $2\sqrt{41}$ km h^{-1} e) 30 mins

Answers Version P

1. a) $a = \frac{1}{16}, b = -\frac{1}{128}$ b) $\frac{5}{2048}$

2. a) 0.0201   b) 0.5198   c) 0.0559

3. a) $2\sqrt{41} = 12.806$ km   b) 321.3°   d) $\sqrt{41}$ km h^{-1} e) 2 hours

Answers Version Q

1. a) $a = \frac{1}{4}, b = -\frac{1}{8}$ b) $\frac{5}{64}$

2. a) 0.0385   b) 0.4938   c) 0.0515

3. a) $\frac{1}{2}\sqrt{41}$ km   b) 321.3°   d) $\frac{1}{2}\sqrt{41}$ km h^{-1} e) 1 hour

Answers Version R

1. a) $a = \frac{1}{9}, b = -\frac{1}{81}$ b) $\frac{5}{3888}$

2. a) 0.0688   b) 0.4386   c) 0.0439

3. a) $10\sqrt{41}$ km   b) 321.3°   d) $2\sqrt{41}$ km h^{-1} e) 5 hours