HIGHER

7.10 Iteration: 1-hour Pack

EDEXCEL 1MA1 · Calculator allowed · about 60 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Show that the equation $x^2 - 5x - 4 = 0$ can be rearranged into the form $x = p + q/x$, where p and q are integers. State the rearranged equation.

(Total for Question 1 is 2 marks)

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2 $f(x) = x^3 + 7x - 1$. The equation $f(x) = 0$ has a root between $x = 0$ and $x = 1$. By evaluating $f(0.5)$, decide whether the root is between 0 and 0.5 or between 0.5 and 1.

(Total for Question 2 is 3 marks)

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3 A sequence is defined by $x_0 = 3$ and $x_{n+1} = (2x_n + 2)^{1/3}$. Work out x_1 and x_2. Give your answers correct to 3 decimal places.

(Total for Question 3 is 3 marks)

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4 $f(x) = x^3 - 7x - 25$. Show that the equation $f(x) = 0$ has a root between $x = 3$ and $x = 4$.

(Total for Question 4 is 3 marks)

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5 $x_0 = 4$ and $x_{n+1} = \sqrt{3x_n + 1}$. Work out the value of x_3. Give your answer correct to 3 decimal places.

(Total for Question 5 is 3 marks)

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6 $f(x) = x^3 - 6x - 39$. The equation $f(x) = 0$ has a root between $x = 3$ and $x = 4$. By evaluating $f(3.5)$, decide whether the root is between 3 and 3.5 or between 3.5 and 4.

(Total for Question 6 is 3 marks)

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7 $f(x) = x^3 - 9x - 30$. Show that the equation $f(x) = 0$ has a root between $x = 4$ and $x = 5$.

(Total for Question 7 is 3 marks)

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8 Show that the equation $x^3 + 6x - 9 = 0$ can be rearranged into the form $x = (q - x^3)/p$, where p and q are integers. State the rearranged equation.

(Total for Question 8 is 2 marks)

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9 $f(x) = x^3 + 8x - 13$. Show that the equation $f(x) = 0$ has a root between $x = 1$ and $x = 2$.

(Total for Question 9 is 3 marks)

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10 $f(x) = x^3 + 6x - 18$. The equation $f(x) = 0$ has a root between $x = 1$ and $x = 2$. By evaluating $f(1.5)$, decide whether the root is between 1 and 1.5 or between 1.5 and 2.

(Total for Question 10 is 3 marks)

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11 $x_0 = 2$ and $x_{n+1} = (2x_n + 3)^{1/3}$. Work out the value of x_3. Give your answer correct to 3 decimal places.

(Total for Question 11 is 3 marks)

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12 $f(x) = x^3 - 6x - 23$. Show that the equation $f(x) = 0$ has a root between $x = 3$ and $x = 4$.

(Total for Question 12 is 3 marks)

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13 $f(x) = x^3 + 7x - 23$. The equation $f(x) = 0$ has a root between $x = 2$ and $x = 3$. By evaluating $f(2.5)$, decide whether the root is between 2 and 2.5 or between 2.5 and 3.

(Total for Question 13 is 3 marks)

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14 A sequence is defined by $x_0 = 3$ and $x_{n+1} = 1 + 1/x_n$. Work out x_1 and x_2. Give your answers correct to 3 decimal places.

(Total for Question 14 is 3 marks)

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15 $f(x) = x^3 + x - 11$. Show that the equation $f(x) = 0$ has a root between $x = 2$ and $x = 3$.

(Total for Question 15 is 3 marks)

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16 $f(x) = x^3 - 3x - 14$. The equation $f(x) = 0$ has a root between $x = 2$ and $x = 3$. By evaluating $f(2.5)$, decide whether the root is between 2 and 2.5 or between 2.5 and 3.

(Total for Question 16 is 3 marks)

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Mark scheme · 7.10 Iteration: 1-hour Pack

Question 1

isolates a term in x correctly	**M1**
$x = 5 + 4/x$	**A1**

Answer: $x = 5 + 4/x$

Question 2

substitutes x = 0.5	**M1**
f(0.5) = 2.625	**A1**
correct interval 0 to 0.5 with a reason	**B1**

Answer: f(0.5) = 2.625, root between 0 and 0.5

Question 3

substitutes $x_0 = 3$	**M1**
$x_1 = 2.000$	**A1**
$x_2 = 1.817$	**A1**

Answer: $x_1 = 2.000$, $x_2 = 1.817$

Question 4

f(3) evaluated	**M1**
f(4) evaluated	**M1**
values with a correct reason (change of sign) and conclusion	**A1**

Answer: f(3) = -19, f(4) = 11, a change of sign

Question 5

x_1 found correctly	**M1**
x_2 found correctly using x_1	**M1**
$x_3 = 3.363$	**A1**

Answer: $x_3 = 3.363$

Question 6

substitutes x = 3.5	**M1**
f(3.5) = -17.125	**A1**
correct interval 3.5 to 4 with a reason	**B1**

Answer: f(3.5) = -17.125, root between 3.5 and 4

Question 7

f(4) evaluated	**M1**
f(5) evaluated	**M1**
values with a correct reason (change of sign) and conclusion	**A1**

Answer: f(4) = -2, f(5) = 50, a change of sign

Question 8

isolates a term in x correctly	**M1**
$x = (9 - x^3)/6$	**A1**

Answer: $x = (9 - x^3)/6$

Question 9

f(1) evaluated	**M1**
f(2) evaluated	**M1**
values with a correct reason (change of sign) and conclusion	**A1**

Answer: f(1) = -4, f(2) = 11, a change of sign

Question 10

substitutes x = 1.5	**M1**
f(1.5) = -5.625	**A1**
correct interval 1.5 to 2 with a reason	**B1**

Answer: f(1.5) = -5.625, root between 1.5 and 2

Question 11

x_1 found correctly	**M1**
x_2 found correctly using x_1	**M1**
$x_3 = 1.894$	**A1**

Answer: $x_3 = 1.894$

Question 12

f(3) evaluated	**M1**
f(4) evaluated	**M1**
values with a correct reason (change of sign) and conclusion	**A1**

Answer: f(3) = -14, f(4) = 17, a change of sign

Question 13

substitutes x = 2.5	**M1**
f(2.5) = 10.125	**A1**
correct interval 2 to 2.5 with a reason	**B1**

Answer: f(2.5) = 10.125, root between 2 and 2.5

Question 14

substitutes $x_0 = 3$	**M1**
$x_1 = 1.333$	**A1**
$x_2 = 1.750$	**A1**

Answer: $x_1 = 1.333$, $x_2 = 1.750$

Question 15

f(2) evaluated	**M1**
f(3) evaluated	**M1**
values with a correct reason (change of sign) and conclusion	**A1**

Answer: f(2) = -1, f(3) = 19, a change of sign

Question 16

substitutes x = 2.5	**M1**
f(2.5) = -5.875	**A1**
correct interval 2.5 to 3 with a reason	**B1**

Answer: f(2.5) = -5.875, root between 2.5 and 3

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