Estimation of the roots of polynomial equation Solutions Main Menu

93 One approximate solution of the equation $f(x)=4x^3-15x^2+22x-12$ is $x=1.3$. What is another approximation to this solution using one application of Newton's method?

(A) $x=1.2884$
(B) $x=1.2885$
(C) $x=1.2886$
(D) $x=1.2887$

94 The polynomial equation $f(x)=x^3+x-1$ has a root near $x=0.5$. What is an approximation to the root using one application of Newton's method?

(A) $x=0.7141$
(B) $x=0.7142$
(C) $x=0.7143$
(D) $x=0.7144$

95 The polynomial $P(x)=5x^3+3x^2+1$ has one real root in the interval $-1<x<0$.
Let $x=-0.25$ be a first approximation to the root.
Which of the following statements is correct?

(A) $x=1.7\dot{2}$ is a better approximation using Newton's method.
(B) Maximum stationary point is between $x=-0.25$ and the actual root.
(C) $x=0.58$ is a better approximation using Newton's method.
(D) Maximum stationary point is between $x=-0.25$ and the actual root.

96 The function $f(x)=\sin x-\frac{2x}{3}$ has a real root close to $x=1.5$.

Let $x=1.5$ be a first approximation to the root.
What is the second approximation to the root using Newton's method?

(A) 1.495
(B) 1.496
(C) 1.503
(D) 1.504

97 One approximate solution of the equation $\cos x-\frac{x}{3}=0$ is $x=1.1$. What is another approximation to this solution using one application of Newton's method?

(A) $x=1.052$
(B) $x=1.171$
(C) $x=1.198$
(D) $x=2.896$

98 Let $x=3.4$ be a first approximation to the root of the equation $\log_e x+x^2-4x+1=0$.
What is a better approximation to the root using Newton's method?

(A) 3.3406
(B) 3.3712
(C) 3.3891
(D) 3.5042

99 Let $x=1$ be a first approximation to the root of the equation $\cos x=\log_e x$.
What is a better approximation to the root using Newton's method?

(A) 1.28
(B) 1.29
(C) 130
(D) 1.31

100 One approximate solution of the equation $\frac{\pi}{4}+\tan^{-1}x-x^2=0$ is $x=1$. What is another approximation to this solution using one application of Newton's method?

(A) $x=1.3805$
(B) $x=1.3914$
(C) $x=1.4125$
(D) $x=1.4156$

101 Taking $\theta=1.7$ radians as an approximation for the solution to the equation $f(\theta)=2\sin\theta-\theta$. What is another approximation to this solution using one application of Newton's method?

(A) $\theta=1.73$
(B) $\theta=1.83$
(C) $\theta=1.93$
(D) $\theta=2.03$

Estimation of the roots of a polynomial equation	Main Menu	
	Solution	**Criteria**
93	$f(x)=4x^3-15x^2+22x-12$ and $f'(x)=12x^2-30x+22$ $x_1=x_0-\frac{f(x_0)}{f'(x_0)}$ $=1.3-\frac{0.038}{3.28}$ $=1.288414634...\approx 1.2884$	1 Mark: A
94	$f(x)=x^3+x-1$ and $f'(x)=3x^2+1$ $x_1=x_0-\frac{f(x_0)}{f'(x_0)}$ $=0.5-\frac{-0.375}{1.75}$ $=0.71428571...\approx 0.7143$	1 Mark: C
95	Newton's method is calculating the x-intercept from the tangent to the curve at the approximation $x=-0.25$. However there is a maximum stationary point at $(-\frac{2}{5},\frac{29}{25})$ between $x=-0.25$ and the actual root. This results in the second approximation ($x=1.7\dot{2}$) further from the actual root.	1 Mark: B
96	$f(x)=\sin x-\frac{2x}{3}$ $f'(x)=\cos x-\frac{2}{3}$ $x_1=x_0-\frac{f(x_0)}{f'(x_0)}$ $=1.5-\frac{\sin 1.5-\frac{2}{3}\times 1.5}{\cos 1.5-\frac{2}{3}}$ $=1.49579...\approx 1.496$	1 Mark: B
97	$f(x)=\cos x-\frac{x}{3}$ $f'(x)=-\sin x-\frac{1}{3}$ $x_1=x_0-\frac{f(x_0)}{f'(x_0)}$ $=1.1-\frac{\cos 1.1-\frac{1.1}{3}}{-\sin 1.1-\frac{1}{3}}$ $=1.170989437...$ $=1.171$	1 Mark: B

98	$f'(x)=\frac{1}{x}+2x-4$ $f'(3.4)=\frac{1}{3.4}+2\times 3.4-4$ $=\frac{263}{85}$ (or 3.0941176...) $f(3.4)=\log_e 3.4+3.4^2-4\times 3.4+1$ $=\log_e 3.4-\frac{26}{25}$ (or 0.18377543...) $x_1=x_0-\frac{f(x_0)}{f'(x_0)}$ $=3.4-\frac{\log_e 3.4-\frac{26}{25}}{\frac{263}{85}}$ $=3.340604899...\approx 3.3406$	1 Mark: A
99	$f(x)=\cos x-\log_e x$ and $f'(x)=-\sin x-\frac{1}{x}$ $x_1=x_0-\frac{f(x_0)}{f'(x_0)}$ $=1-\frac{\cos 1-\log_e 1}{-\sin 1-1}$ $=1.293407993...\approx 1.29$	1 Mark: B
100	$f'(x)=\frac{1}{1+x^2}-2x$ $f'(1)=\frac{1}{1+1}-2$ $=-1.5$ $f(1)=\frac{\pi}{2}-1$ $x_1=x_0-\frac{f(x_0)}{f'(x_0)}$ $=1-\frac{\frac{\pi}{2}-1}{-1.5}=1.3805$	1 Mark: A
101	$f(\theta)=2\sin\theta-\theta$ $f(1.7)=2\sin 1.7-1.7$ $\approx 0.2833296209...$ $f'(\theta)=2\cos\theta-1$ $f'(1.7)=2\cos 1.7-1$ $\approx -1.257688989...$ $\theta_1=\theta_0-\frac{f(\theta_0)}{f'(\theta_0)}$ $=1.7-\frac{2\sin(1.7)-1.7}{2\cos(1.7)-1}$ $\approx 1.925277969...$ ≈ 1.93	1 Mark: C