# SOLUTION

## MATH 321-172 HOMEWORK#3

Q: 2(2.1) $f(x) = 3(x+1)(x-1)(x-\frac{1}{2})$

(a) $[-2, 1.5]$, $f(-2) = -\frac{45}{2}$, $f(1.5) = 3.75$

$a = -2$, $b = 1.5$

$p_1 = \frac{-2+1.5}{2} = -0.25$

$f(-0.25) = 2.1094 > 0$, So $b = p_1 = -0.25$

$p_2 = \frac{-2-0.25}{2} = -1.125$

$f(-1.25) = -1.2949 < 0$, So $a = p_2 = -1.25$

$p_3 = \frac{-1.125-0.25}{2} = \boxed{-0.6875}$

$f(p_3) = 1.8787$

Q:4 (2.1) $f(x) = x^4 - 2x^3 - 4x^2 + 4x + 4$, $Tol = 10^{-2}$

(a) $[-2, -1]$ $a = -2$, $b = -1$

(1) $p_1 = \frac{-2-1}{2} = -1.5$ | $f(a) = 12 > 0$, $f(b) = -1 < 0$

$f(p_1) = 0.8125 > 0$

So $a = p_1 = -1.5$, $b = -1$

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(2) $p_2 = \frac{-1.5-1}{2} = -1.25$

$f(p_2) = -0.9023 < 0$,

So $b = -1.25$, $a = -1.5$

$f < 0$ ——— $f > 0$

(3) $p_3 = \frac{-1.5-1.25}{2} = -1.3750$

$f(p_3) = -0.2888 < 0$

So $b = p_3 = -1.3750$, $a = -1.5$

$f < 0$ $f > 0$

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(4) $p_4 = \frac{-1.5-1.3750}{2} = -1.4375$

$f(p_4) = 0.1953 > 0$

So $a = -1.4375$, $b = -1.3750$

$f > 0$ $f < 0$

(5) $p_5 = \dfrac{-1.4375 - 1.3750}{2} = -1.4063$

$f(p_5) = -0.0627 < 0$

So $a = -1.4375$, $b = p_5 = -1.4063$

$f > 0$ $f < 0$

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(6) $p_6 = \dfrac{-1.4375 - 1.4063}{2} = -1.4219$

$f(p_6) = 0.0623 > 0$

So $a = p_6 = -1.4219$, $b = -1.4063$

$f > 0$ $f < 0$

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(7) $p_7 = \dfrac{-1.4219 - 1.4063}{2} = \underline{\underline{-1.4141}}$

$f(p_7) = -0.0012 < 0$

So $a = -1.4219$, $b = -1.4141$

$f > 0$ $f < 0$

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(8) $p_8 = \dfrac{-1.4219 - 1.4141}{2} = \underline{\underline{-1.4180}}$

STOP

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# Q:5 Using MATLAB

(a) $f(x) = x - 2^{-x}$, $0 \le x \le 1$, $TOL = 10^{-5}$

$p = 0.6412$, $f(p) = -5.4870 \times 10^{-6}$, itt = 17

(b) $f(x) = e^x - x^2 + 3x - 2$, $0 \le x \le 1$

$p = 0.2575$, $f(p) = -2.7598 \times 10^{-7}$, itt = 17

(c) $f(x) = 2x\cos(2x) - (x+1)^2$, $-3 \le x \le -2$, $-1 \le x \le 0$

For $-3 \le x \le -2$, $p = -2.1913$, $f(p) = 9.4656 \times 10^{-6}$, itt = 17

For $-1 \le x \le 0$, $p = -0.7982$, $f(p) = 1.6067 \times 10^{-5}$, itt = 17

(d) $f(x) = x\cos x - 2x^2 + 3x - 1$,

For $0.2 \le x \le 0.3$

$p = 0.2975$, $f(p) = -5.7793 \times 10^{-6}$, itt = 14

For $1.2 \le x \le 1.3$

$p = 1.2566$, $f(p) = 2.9360 \times 10^{-6}$, itt = 14

(2.1)

Q:9 (b) $f(x) = e^x - 2 - \cos(e^x - 2) = 0$

$0.5 \leq x \leq 1.5$ , $Tol = 10^{-5}$

$p = 1.0076$

$f(p) = -1.0115 \times 10^{-5}$

$itt = 17$

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Q:13 (2.1) $f(x) = x^3 - 25$ , $Tol = 10^{-4}$

$f(2) = 8 - 25 < 0$ $\quad f(3) = 27 - 25 > 0$

Let $2 \leq x \leq 3$

$p = 2.9240$

$f(p) = -1.6692 \times 10^{-4}$

$itt = 14$

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