5) $F(x) = x^2 - x - 2$ continuous? Yes
   $(x-2)(x+1)$ differentiable? Yes
   $\{2, -1\}$
   $F(2) = 0$
   $F(-1) = 0$

13) $F(x) = (x-1)(x-2)(x-3)$ $[1, 3]$
    cont? Yes $F'(x) = 3x^2 + 12x + 11$
    diff? Yes
                   $0 = 3c^2 + 12c + 11$
    $F(1) = 0$
    $F(3) = 0$

15) $F(x) = x^{\frac{2}{3}} - 1$ $[-8, 8]$
    not differentiable at 0
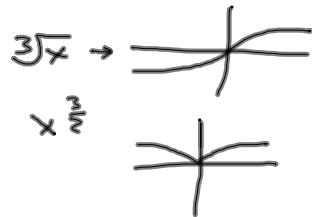
    $3\sqrt{x} \rightarrow$

    $x^{\frac{2}{3}}$

21) $F(x) = \frac{6x}{\pi} - 4\sin^2 x$ $[0, \frac{\pi}{6}]$
    $F(0) = 0$
    $F(\frac{\pi}{6}) = \frac{6}{\pi} \cdot \frac{\pi}{6} - 4\sin^2(\frac{\pi}{6})$
                  $1 - 4(\frac{1}{2})^2$ $\sin^{-1}(3/(2\pi))$
                  $1 - 4(\frac{1}{4})$
                        0

    $F'(x) = \frac{6}{\pi} - 8\sin x \cos x$ $\sin 2c = \frac{3}{2\pi}$
    $0 = \frac{6}{\pi} - 8\sin c \cos c$ $2c = \sin^{-1}(\frac{3}{2\pi})$
    $(8\sin c \cos c = \frac{6}{\pi}) \div 4$ $2c = .498$
    $2\sin c \cos c = \frac{3}{2\pi}$ $\boxed{c = .249}$

41) $F(x) = x^3 + 2x$ $[-1, 1]$
    1) cont? yes
    2) diff? yes $F(1) = 3$
                            $F(-1) = -3$
    $F'(c) = \frac{F(b) - F(a)}{b - a}$
    $3x^2 + 2 = \frac{3 - (-3)}{1 - (-1)}$
    $3c^2 + 2 = 3$
        $3c^2 = 1$ $c^2 = \frac{1}{3}$ $\pm \frac{1}{\sqrt{3}}$

43) $F(x) = x^{2/3}$
    $F(x) = x^{2/3}$ $[0, 1]$
    $F(x) = \sqrt[3]{x^2}$
    $F'(x) = \frac{2}{3} x^{-\frac{1}{3}} = \frac{1^{2/3} - 0^{2/3}}{1 - 0}$
            $\frac{2}{3} c^{-\frac{1}{3}} = 1$
            $\frac{2}{3\sqrt[3]{c}} = 1$ → $(\frac{2}{3})^3 \, \sqrt[3]{c}^3$
                            $\frac{8}{27} = c$

47) $F(x) = \sin x$ $[0, \pi]$
    $F'(c) = \cos c = \frac{\sin\pi - \sin 0}{\pi - 0}$
             $\cos c - \frac{0}{\pi} = 0$
             $\cos c = 0$
                $c = \cos^{-1}(0)$
                $c = \frac{\pi}{2}$