EMCF 22

1

Use differentials to estimate the value indicated.

$$\sin(34^\circ)$$

a) $\frac{1}{2} + \frac{1}{90}\sqrt{3}\,\pi$

b) $\frac{1}{2} - \frac{1}{90}\sqrt{3}\,\pi$

c) $\frac{9}{2}$

d) $\frac{1}{90}\sqrt{3}\,\pi$

e) $1 + \frac{1}{90}\sqrt{3}\,\pi$

2

Use one iteration of the Newton-Raphson method to estimate a root of the equation $f(x) = 0$ starting at the indicated value of x.

$$f(x) = x^5 - 33$$
$$x_1 = 2$$

a) ○ $^{161}/_{80}$

b) ○ -8

c) ○ $^{159}/_{80}$

d) ○ $-\,^{1}/_{2}$

e) ○ $^{9}/_{2}$

3

Find the intervals on which f increases.

$$f(x) = \frac{5x}{1+x^2}$$

a) ○ $(-\infty, -1) \cup (1, \infty)$

b) ○ $(-\infty, -1)$

c) ○ $(-\infty, \infty)$

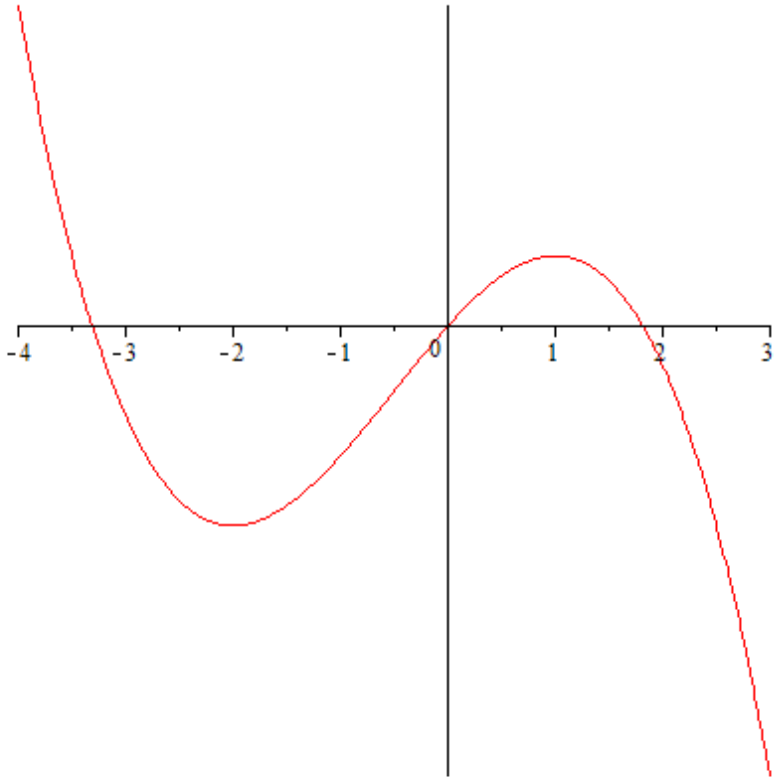
d) ○ $(1, \infty)$

e) ○ $(-1, 1)$

4	Find the critical numbers of f and classify all local extreme values. $f(x) = 3x^2 - \frac{5}{x^2}$ **a)** ○ Critical no. $5/3$; local min $f(5/3) = 98/15$. **b)** ○ No critical numbers, no extreme values. **c)** ○ Critical no. 0; local min $f(0) = 0$. **d)** ○ Critical no. 0; local max $f(0) = 0$. **e)** ○ Critical no. $5/3$; local max $f(5/3) = 98/15$.
5	A rectangular garden 98 square feet in area is to be fenced off against rats. Find the dimensions that will require the least amount of fencing if one side of the garden is already protected by a barn. **a)** ○ 56 by 7/4 feet **b)** ○ 16 by 6 feet **c)** ○ 14 by 7 feet **d)** ○ 42 by 7/3 feet **e)** ○ 13 by 6 feet

6

The graph of $f'(x)$ is shown below. Give the interval(s) where the graph of $f(x)$ is concave down.



a) ○ $(-\infty, -2) \cup (1, \infty)$

b) ○ $(0, \infty)$

c) ○ $(-2, 1)$

d) ○ $(-\infty, 0) \cup (1, \infty)$

e) ○ $(-\infty, 0)$

7

Suppose that $c = -3$ is a critical number for a function f. Determine if $f(c)$ is a local maximum, local minimum or neither if

$$f'(x) = -x^3 - 10x^2 - 31x - 30$$

a) ○ Local Minimum

b) ○ Local Maximum

c) ○ Neither

8

Which of the following is true about the graph of f?

$$f(x) = 9x^3 - 18x^2 + 9x + 1$$

a) ○ $f(x)$ has a local minimum at the point $(\frac{1}{3}, \frac{7}{3})$.

b) ○ $f(x)$ has a point of inflection at the point (1, 1).

c) ○ $f(x)$ has a local maximum at the point (1, 1).

d) ○ $f(x)$ is decreasing on the interval $(\frac{1}{3}, 1)$.

e) ○ $f(x)$ is increasing on the interval $(\frac{2}{3}, \infty)$.

9	Which of the following is true about the graph of f? $$f(x) = 8x^2 + \frac{54}{x} - 5$$ **a)** ○ $f(x)$ has a point of inflection at the point (0, -5). **b)** ○ $f(x)$ is increasing on the interval $(-\infty, 0)$. **c)** ○ $f(x)$ has a vertical asymptote at $x = 54$. **d)** ○ $f(x)$ has a local minimum at the point ($^3\!/_2$, 49). **e)** ○ $f(x)$ is concave down on the interval $(0, \infty)$.
10	Find the largest possible area for a rectangle with base on the x-axis and upper vertices on the curve $$y = 6 - x^2$$ **a)** ○ $8\sqrt{6}$ **b)** ○ $8\sqrt{2}$ **c)** ○ $16\sqrt{2}$ **d)** ○ 8 **e)** ○ $4\sqrt{2}$